

 شركة طرق الرياض للمقاولات RIYADH ROAD CONTRACTING CO.	 شركة ساني العامرية SANY Alameriah Co.	 مكتب رمك للإستشارات الهندسية RAMAK ENGINEERING CONSULTANTS OFFICE
FROM : شركة طرق الرياض للمقاولات المحدودة	المطور : شركة ساني العامرية TECHNICAL SUBMITTAL	To : مكتب رمك للاستشارات الهندسية
مشروع تنفيذ اعمال البنية التحتية بمخطط تلال الغروب رقم 1837 / 1 / س - جده Block (1&3&5&10&11&12&13)		
SUBMITTAL NO. : 122	NEW SUBMITTAL ☒	RE SUBMITTAL ☐
TRANSMITTAL FOR :	METHOD STATEMENT ☐	CALCULATIONS ☐ CATALOGUE ☐ CERTIFICATE ☐ OTHERS ☐
MATERIAL TEST ☒	TEST RESULTS ☐	SAMPLE ☐ DRAWING ☐ STRUCTURAL ☐ SCHEDULE P6 ☐
PROJECT MANAGEMENT ☐	EARTH WORK ☒ SEWAGE ☐	ELECTRICAL ☐ WATER ☐ CIVIL ☒ MECHANICAL ☐
الموقع	BLOCK-03-10-11-13	ATTACHMENT : ☒
NO.	NAME AND DESCRIPTION	MANUFACTURER / SUPPLIER
1	ASPHALT MIX DESIGN BITUMINOUS BASE COURSE (BWC SP)	شركة انجاز الطرق للمقاولات المحدودة RACO
CONTRACTOR'S REMARKS		SIGNATURE التوقيع Contractor PROJECT MANAGER م / محمد غمري
INFRASTRUCTURE CONSULTANT COMMENTS :		SIGNATURE التوقيع Consultant PROJECT MANAGER م / فهمي عبد الله
لا مانع من اعتماد الخلطة الإسفلتيه (BWC SP) حيث أنها معتمده لدى الأمانة لمشاريع سابعه عند البدء في أعمال في المشروع.		DEVELOPER PROJECT MANAGER COMMENTS : PROJECT MANAGER م / علاء شلتوت
DEVELOPER PROJECT MANAGER COMMENTS :		See Attachment ☒
REF. IN : ☒ A = APPROVED B = APPROVED AS NOTED C = APPROVED AS NOTED, RESUBMIT E = DISAPPROVED F = NO ACTION		
REF. OUT :		

بسم الله الرحمن الرحيم

الرقم: ٤٦٠٠٠١٧٠٩٤

النسخة: ٢

التاريخ: ١٤٤٦/٠٤/٢٥ هـ

المرفقات:



المملكة العربية السعودية

وزارة البلديات والإسكان

أمانة محافظة جدة (٣١٤)

الموضوع: بشأن تحديث اعتماد الخلطة الاسفلتية (BWC SP)

المحترمين

السادة/ شركة انجاز الطرق للمقاولات المحدودة

رقم السجل التجاري ٤٠٣٠١٤٨٧٩١ ص.ب ٢٣٤٦٢ الرمز البريدي ٢٣٤٥٥

السلام عليكم ورحمة الله وبركاته

إشارة الى خطابكم رقم ٢٠٢٤/أ/٣٥٧٠ بتاريخ ٢٠٢٤/٨/١٣م المقيد لدى الأمانة برقم ٤٦٠٠٠١٧٠٩٤ وتاريخ ١٤٤٦/٢/١٠ هـ بخصوص طلب تحديث اعتماد الخلطة الاسفلتية السطحية بنظام السوبريفيف (BWC SP) للمشاريع المذكورة بخطابكم.

عليه نفيديكم أنه بعد دراسة طلب اعتماد المواد المذكورة أعلاه فقد اتضح لنا انها مطابقة للشروط والمواصفات

المعتمدة لدينا.

الرف

وتقبلوا خالص التحية والتقدير ،،،

مدير عام التشغيل والصيانة

١٤٤٦/٠٤/٢٦ هـ

م. يوسف بن ظافر الأسمرى

التاريخ : 1446/04/05 هـ

الموافق : 2024/10/08 م

المرجع : DAR/QC/0092/2024

رقم الأمانة : 4600017094

الموضوع : بشأن تحديث اعتماد الخلطة الأسفلتية (BWC) سوبريف.
المشروع : مشاريع التشغيل و الصيانة – أمانة محافظة جدة .
المقاول : شركة إنجاز الطرق للمقاولات المحدودة .

سعادة مدير عام التشغيل و الصيانة بأمانة محافظة جدة

الموقر

السلام عليكم ورحمة الله وبركاته ،،،

إشارةً إلى خطاب سعادتكم بالرقم (4600017094) وتاريخ (1446/02/22 هـ) و المبني على خطاب شركة إنجاز الطرق للمقاولات المحدودة بتاريخ (2024/08/13 م) بشأن تحديث اعتماد الخلطات الأسفلتية السطحية (BWC SP) بنظام سوبر بيف (Superpave) للمشاريع المذكورة في خطاب المقاول .

نفيد سعادتكم بأنه تم أخذ العينات من الخلطة الأسفلتية للمقاول و تم إجراء اختبارات الجودة عليها في مختبر مستقل معتمد من أمانة محافظة جدة ، و بعد مقارنة النتائج تبين أنها مطابقة لمواصفات وزارة الشؤون البلدية و القروية و الإسكان. للعلم و الأمانة و إتخاذ ما ترونه مناسباً

وتفضلوا بقبول فائق الإحترام والتقدير،،،

العبد

مدير البرنامج



المرفقات :-

- نتائج الإختبارات .
- شهادات المعايرة .

صفحة 1 من 1



التاريخ : ٢٠٢٤/٠٩/١٠ م

رقم المعاملة : ٤٦٠٠٠١٧٠٩٤

المحترمين

السادة / دار الرياض

السلام عليكم ورحمة الله وبركاته

الموضوع : تحديث اعتماد الخلطة الاسفلتية للطبقة السطحية لخلطة السوبر بيف .

المشروع : مشاريع الصيانة .

بالإشارة الي العينات الواردة الينا بتاريخ ٢٠٢٤-٠٩-٠٥ من طرفكم والخاصة بشركة انجاز الطرق للمقاولات. المتضمنة عينات من خلطة الأساس الاسفلتية سوبر بيف (BWC).

نحيط سعادتكم علما أنه قد تم اجراء اختبارات الجودة للخلطة الاسفلتية ، وتبين مطابقة العينات الواردة حسب مواصفات وزارة النقل لتصميم الخلطات الساخنة.

وتقبلوا فائق التقدير والإحترام،،،

مدير المختبر

م / باسم المغربي

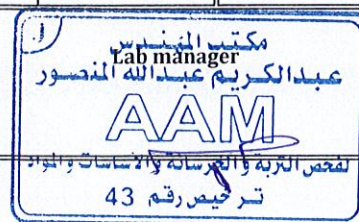




BITUMEN EXTRACTION TEST

Consultant	Dar AL-Riyadh						AAM-J-230043	
Contractor	Road Accomplishment Co LTD						Sample Brought	Contractor
Contract No								Consultant
Project	مشروع الصيانة						Date received	5/9/2024
Ref No.	4600017094						Date start	7/9/2024
Location	جدة						Date complet	8/9/2024
	SUPERPAVE (B.W.C)							
EXTRACTION TEST		ASTM SIEVE ANALYSIS OF AGGREGATE						
Test		Results	SIEVES	RETAINED gm	RETAINED %	PASSING %	JOB.MIX	SPEC'LIMTS
Wt of mix	gm	2241.8	1"	0	0.0	100.0	100	100
Wt of filter paper before test	gm	32.8	3/4"	0	0.0	100.0	100	100
Wt of filter paper after test	gm	34.1	1/2"	103.6	4.9	95.1	90 - 98	90 - 100
Wt of aggregate after test	gm	2125.3	3/8"	470.4	22.1	77.9	74 - 82	90 Max
Total wt of aggregate	gm	2126.6	# 4	920.6	43.3	56.7	50 - 60	
Loss of weight	gm	115	# 8	1333.3	62.7	37.3	33 - 41	28-58(PCS=47)
			# 16	1545.7	72.7	27.3	23 - 31	
Bitumen by wt of mix	%	5.14	# 30	1694.2	79.7	20.3	16 - 24	
			# 50	1810.1	85.1	14.9	10 - 18	
			# 100	1959.3	92.1	7.9	07 - 11	
Bitumen content of the mix	%	5.14	# 200	2029.4	95.4	4.6	3.5 - 6.5	2 - 10
Job mix Limit	%	5.00 ± 0.4	Total	2127				

Checked by





Consultant	Dar AL-Riyadh				AAM-J-230043		
Contractor	Road Accomplishment Co LTD				Sample Brought	Contractor	
Contract No						Consultant	
Project	مشاريع الصيانة				Date received	5/9/2024	
Ref. NO	4600017094				Date test start	7/9/2024	
Location	جدة				Date test comple	9/9/2024	
Mix Type	SUPERPAVE (B.W.C)						
Superpave Gyrotory Compaction Bulk Specific Gravity of Compacted Specimen							
	Ndes			specs	Nmax		
Specimen I.D.	1	2	Ave		1	2	Ave
a. Weight in air, dry (gm)	4825.6	4865.3			4882.2	4810.9	
b. Weight in air, SSD (gm)	4847.1	4889.2			4898.1	4826.2	
c. Weight in water, (gm)	2895.2	2926.6			2954.8	2915.2	
d. Volume, (cc)	1951.9	1962.6			1943.3	1911.0	
e. Specific Gravity (Gmb) (a/d) by Corelok	2.472	2.479	2.476		2.512	2.517	2.515
Height @ Nini	125.2	125.8			127.0	126.5	
Height @ Ndes	114.5	114.3			115.5	115.7	
Height @ Nmax					113.9	114.1	
% Gmm @ Nini	87.4	87.1	87.3	89 Max			
% Gmm @ Ndes	95.6	95.9	95.7	94.5 - 97.5			
% Gmm @ Nmax				98 Max	97.2	97.4	97.3
Air Voids %	4.4	4.1	4.3	2.5 - 5.5			
Voids in Mineral Aggregate (VMA) %	15.4	15.1	15.3	14 - 16			
Voids Filled (VF) %	71.4	72.7	72.0	65 - 75			
Asphalt Content	5.14						
Maximum Theoretical Specific Gravity (Gmm)							
Specimen I.D.	1	2	specs	Gb =	1.026		
a. Net weight of loose mix (gm)	2205.6	2175.3		Gsb =	2.771		
b. Net weight of flask & water (gm)	8378.6	8378.6		Ps =	94.86		
c. Net weight of flask, loose mix & water	9732.0	9712.0		Gse =	2.818		
d. Maximum Theoretical Specific Gravity, Gmm (A/(A+B-C))	2.588	2.584		Pba =	0.62		
e. Average Gmm	2.586			Pbe =	4.55		
			0.9 - 1.6	DP	1.00		
Remarks : All Results of Sample Are Pass As Requirement of Design.							
Checked by							





Contractor	Road Accomplishment Co LTD	Project No	AAM-J-240127			
Consultant	Dar AL-Riyadh	Project NO				
Project	مشاريع الصيانة	Ref . NO	4600017094			
Location	جدة	Date Rec.	05/09/2024			
Bituminous (B.W.C)						
<u>EVALUATION OF STRENGTH AND MOISTURE SENSITIVITY</u>						
Property	Dry Set (Control)			Wet Set (Conditioned)		
	1	2	3	4	5	6
Diameter, mm	150	150	150	150	150	150
Thickness, mm	93.5	94.8	93.5	94.2	95.1	94.8
Wt. of Dry Sample in air, g	3877.2	3885.5	3870.1	3886.9	3892.2	3880.8
Wt. of SSD Sample in Air, g	3904.6	3911.2	3892.5	3908.6	3917.6	3906.5
Wt. of Sample in Water, g	2292.4	2298.1	2280.0	2291.2	2301.3	2292.0
Volume	1612.2	1613.1	1612.5	1617.4	1616.3	1614.5
Bulk Spec. Gravity	2.405	2.409	2.400	2.403	2.408	2.404
Maximum Specific Gravity (Gmm)	2.586	2.586	2.586	2.586	2.586	2.586
% Air Voids	7.0	6.9	7.2	7.1	6.9	7.0
Maximum Load, Newton	17695	17485	17620			
Dry Tensile Strength, Kpa	803	783	800			
Average	795					
Conditioned 24 Hours in 60°C Water						
Thickness, mm				94.2	95.1	94.8
Maximum Load, Newton				14652	14841	14367
Wet Tensile Strength, KPA				660	662	643
Average				655		
Computation and Comparison with SUPERPAVE Criteria						
Property	ITS	Tensile Strength Ratio	Meet Criteria	SUPERPAVE Criteria		
Tensile Strength of dry set, Kpa	795	82.4	Yes	80% Min		
Tensile Strength of wet set, Kpa	655					
Remarks : No. of Gyration = 51						

Checked by



Certificate No :HOM/CCJ/13713

Date: June 26, 2024

M/s Enjaz Al Turk CompanyRoad Accomplishment Ltd . For Contracting - RACO
Jeddah - K.S.A

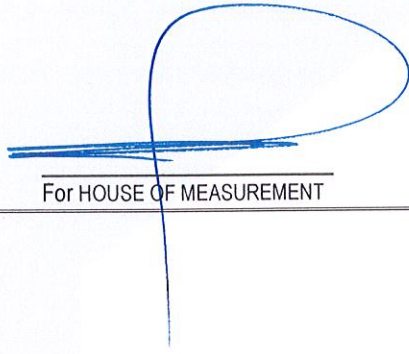
ISO / IEC 17025 -2017 & TUV - ISO 9001 : 2015

CERTIFICATE OF CALIBRATION

CERTIFIES THAT THE INSTRUMENT LISTED BELOW HAS BEEN TESTED / CALIBRATED USING STANDARDS WHOSE ACCURACY'S ARE TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY USA. WITHIN THE LIMITATION OF THESE LABORATORIES CALIBRATION SERVICES, OR HAVE BEEN DERIVED BY THE RATIO OF SELF-CALIBRATION TECHNIQUES. INFORMATION ON THE CALIBRATION PROCESS AND ITS RESULTS IS GIVEN IN THE CONTINUATION AS PER ATTACHMENT OF THIS DOCUMENT.

DESCRIPTION	:	ASPHALT PLANT
PLANT	:	AMP 2500 C
SCALE TYPE	:	ELECTRONIC - METTLER TOLEDO IND 320 L
DETAILS	:	AGGRIGATE SCALE BITUMEN SCALE FILLER SCALE
PLANT LOCATION	:	BARIMAN - AREA
DATE OF CALIBRATION	:	JUNE 26, 2024
NEXT CALIBRATION DUE	:	JUNE 26, 2025

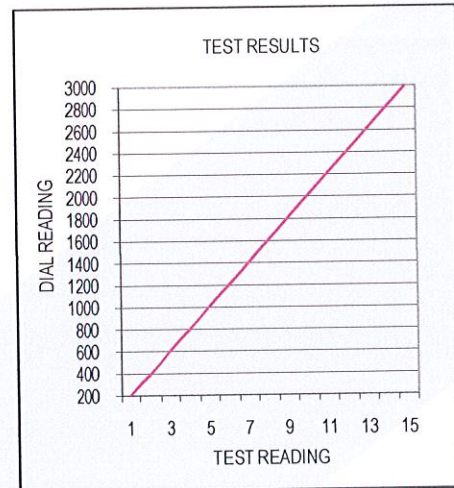
CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION.


For HOUSE OF MEASUREMENT

TEST RESULT OF CALIBRATION

Company	Enjaz Al Turk Company / Road Accomplishment Ltd for Contracting RACO		
Address	Jeddaah - Bariman K.S.A		
Location	Bairam	Certificate No:HOM/CC/J/13713	
Equipment Type	Aggregate Scale	ScaleType	Mettler IND320 L
Plant	AMP 2500 C	S.No	B 511707046
Capacity	4000 Kg x 1 Kg	Date of Cal	26/06/2024

Indicator Readings	Test-1 Kg	Test-2 Kg	Test-3 Kg	Mean Kg	Error. %
200	200	200	200	200	0
400	400	400	400	400	0
605	605	605	605	605	0
803	803	803	803	803	0
1004	1004	1004	1004	1004	0
1205	1205	1205	1205	1205	0
1402	1402	1402	1402	1402	0
1603	1603	1603	1603	1603	0
1804	1804	1804	1804	1804	0
2005	2005	2005	2005	2005	0
2206	2206	2206	2206	2206	0
2403	2405	2403	2403	2404	0.03
2602	2604	2603	2602	2603	0.04
2804	2806	2805	2804	2805	0.04
3002	3005	3003	3002	3003	0.04



ABOVE INSTRUMENT HAS BEEN TESTED AND CALIBRATED BY USING SASO STANDARD ABOVE READINGS HAVE BEEN FOUND WITH IN TOLERANCE LIMIT. RESULTS ARE INTERPRETED AND COMPLAINE WITH ASTM E4-93 STANDARD.

BASIS OF TEST	WORKING WITH IN TOLERANCE LIMIT	PASS
EQUIPMENT CONDITION	EQUIPMENT WAS ADJUSTED	YES
ADDITIONAL COMMENTS	EQUIPMENT REQUIRED REPAIRING	NO

THIS CERTIFICATE IS VALID FOR ONE (1) YEAR FROM THE DATE OF CALIBRATION.


For HOUSE OF MEASUREMENT

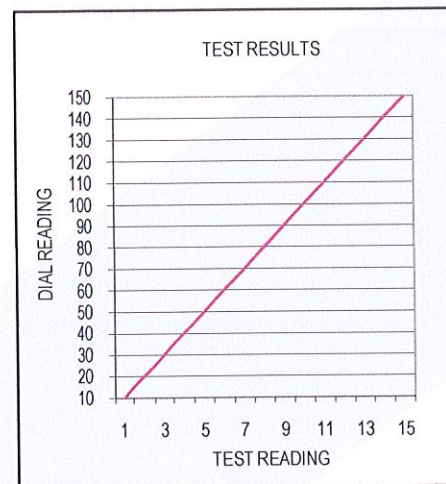



CALIBRATED BY

TEST RESULT OF CALIBRATION

Company	Enjaz Al Turk Company / Road Accomplishment Ltd for Contracting RACO		
Address	Jeddaah - Bariman K.S.A		
Location	Bairam		
	Certificate No:HOM/CC/J/13713		
Equipment Type	Bitumen Scale	ScaleType	Mettler IND320 L
Plant	AMP 2500 C	S.No	B 511707045
Capacity	400 Kg x 0.1 Kg	Date of Cal	26/06/2024

Indicator Readings	Test-1 Kg	Test-2 Kg	Test-3 Kg	Mean Kg	Error. %
10	10	10	10	10	0
20	20	20	20	20	0
30	30	30	30	30	0
40	40	40	40	40	0
50	50	50	50	50	0
60	60	60	60	60	0
70	70	70	70	70	0
80	80	80	80	80	0
90	90	90	90	90	0
100	100	100	100	100	0
110	110	110	110	110	0
120	120	120	120	120	0
130	130	130	130	130	0
140	139.9	140.0	140.0	140.0	0.02
150	149.9	150.0	150.0	150.0	0.02



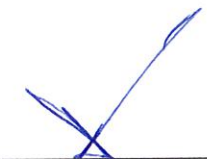
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BASIS OF TEST		
EQUIPMENT CONDITION	WORKING WITH IN TOLERANCE LIMIT	PASS
	EQUIPMENT WAS ADJUSTED	YES
ADDITIONAL COMMENTS	EQUIPMENT REQUIRED REPAIRING	NO

THIS CERTIFICATE IS VALID FOR ONE (1) YEAR FROM THE DATE OF CALIBRATION.


For HOUSE OF MEASUREMENT

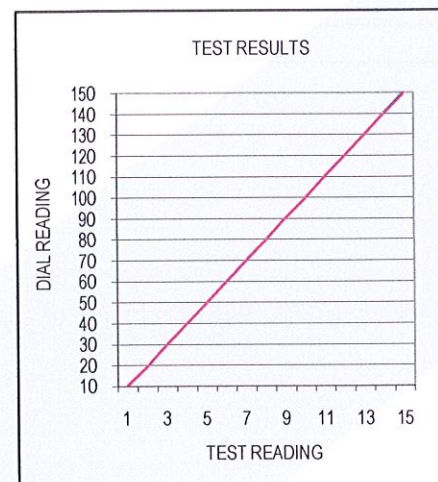



CALIBRATED BY

TEST RESULT OF CALIBRATION

Company	Enjaz Al Turk Company / Road Accomplishment Ltd for Contracting RACO		
Address	Jeddaah - Bariman K.S.A		
Location	Bairam		
	Certificate No:HOM/CCJ/13713		
Equipment Type	Filler Scale	Flow Meter	Mettler IND320 L
Plant	AMP 2500 C	S.No	B 511707044
Capacity	400 Kg x 0.1 Kg	Date of Cal	26/06/2024

Indicator Readings	Test-1 Kg	Test-2 Kg	Test-3 Kg	Mean Kg	Error. %
10	10	10	10	10	0
20	20	20	20	20	0
30	30	30	30	30	0
40	40	40	40	40	0
50	50	50	50	50	0
60	60	60	60	60	0
70	70	70	70	70	0
80	80	80	80	80	0
90	90	90	90	90	0
100	100	100	100	100	0
110	110	110	110	110	0
120	120	120	120	120	0
130	130	130	130	130	0
140	139.9	139.9	140.0	139.9	0.05
150	149.9	149.9	150.0	149.9	0.04



ABOVE INSTRUMENT HAS BEEN TESTED AND CALIBRATED BY USING SASO STANDARD ABOVE READINGS HAVE BEEN FOUND WITH IN TOLERANCE LIMIT. RESULTS ARE INTERPRETED AND COMPLAANCE WITH ASTM E4-93 STANDARD.

BASIS OF TEST		
EQUIPMENT CONDITION	WORKING WITH IN TOLERANCE LIMIT	PASS
	EQUIPMENT WAS ADJUSTED	YES
ADDITIONAL COMMENTS	EQUIPMENT REQUIRED REPAIRING	NO

THIS CERTIFICATE IS VALID FOR ONE (1) YEAR FROM THE DATE OF CALIBRATION.


For HOUSE OF MEASUREMENT




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المملكة العربية السعودية
وزارة الشؤون البلدية والقروية



*Kingdom Of Saudi Arabia
Ministry of Municipal & Rural Affairs*

Contractor :- Road Accomplishment CO.

Superpave Mix Design

Bitumenous Wearing Coarse

شركة إنجاز الطرق للمقاولات

Kingdom of Saudi Arabia

Ministry of Transport

General Direct. for Materials & Research

Quality Control Department



المملكة العربية السعودية

وزارة النقل

الإدارة العامة للمواد والبحوث

إدارة ضبط الجودة

Superpave Mix Design Report

Page 1 of 13

Mix Design Reference No.	12.5R2C4y	Date	10/2/2019
Project Information and Basic Design Parameters			
Project	مشاريع الشركة مع امانة محافظة جدة		
Contractor	شركة انجاز الطرق للمقاولات المحدودة		
Consultant	لويس برجر		
Project Location	Jeddah		
Mix Type	Bituminous Wearing Course		
Type of Facility	Highways		
Layer Thickness, mm	50.0	Nominal Maximum Size, mm	12.5
Thickness of the pavement above the layer, mm	0.0	Position of the layer for the design purposes (Either ≤ 100 mm or > 100 mm)	< 100
Design Traffic Class Designation (or ESALs)	Heavy (10-30 million ESAL's)	New Design	Yes
Submitted By		Approved By	
Name	Hosam Ramadan		
Designation	Material Engineer		
Date			
Signature			

Hot-Mix Asphalt Criteria

Summary of the Basic Design Parameters of the Mix Design

Project	مشاريع الشركة مع امانة محافظة جدة
Design Traffic Class Designation (or ESALs)	Heavy (10-30 million ESAL)
Position of the layer for the design purposes (Either <100 mm or > 100 mm)	< 100
Nominal Maximum Size, mm	12.5

Summary of the Design Parameters for the HMA as Required by SUPERPAVE Mix Design System

Item	Property		Requirement	Level
SUPERPAVE Criteria for the Aggregate Consensus Properties	Coarse Aggregate Angularity, %	One Fractured Face	95.0	Min
		Two or More Fractured Faces	90.0	Min
	Fine Aggregate Angularity, %		45.0	Min
	Flat & Elongated Particle, %		10.0	Max
	Sand Equivalent, %		45.0	Min
SUPERPAVE Gyrotory Compactive Effort (SGCE)	No. of Gyrations	N _{initial}	8	n/a
		N _{design}	100	n/a
		N _{max}	160	n/a
SUPERPAVE Criteria for the Volumetric Mixture Design	Required Density, % G _{mm}	N _{initial}	89.0	Max
		N _{design}	96.0	n/a
		N _{max}	98.0	Max
	Voids in the Mineral Aggregate, % (VMA)		14.0	Min
			16.0	Max
	Voids Filled with Asphalt, % (VFA)		65.0	Min
			75.0	Max
	Dust to Binder Ratio (DP)		0.90	Min
			1.60	Max
	Dry Indirect Tensile Strength, kPa		Report	Min
			1400.0	Max
	Retained Indirect Tensile Strength for the Wet Set Compared to the Dry Set, %		80%	Min
Required Binder PG for the Project Based on Environmental Considerations Only	High Temperature		70	Min
	Low Temperature		-10	Min

Asphalt Binder Data

Binder Grade Selection

Selected Asphalt Binder PG From Temperature Zoning Map of the Kingdom of Saudi Arabia		PG 70-10
PG Adjustment for Traffic Level and Speed	Click here to view the grade adjustment table	1
Final Recommended ABPG for the Project	High Temperature	76
	Low Temperature	-10

Polymer Modification Requirements

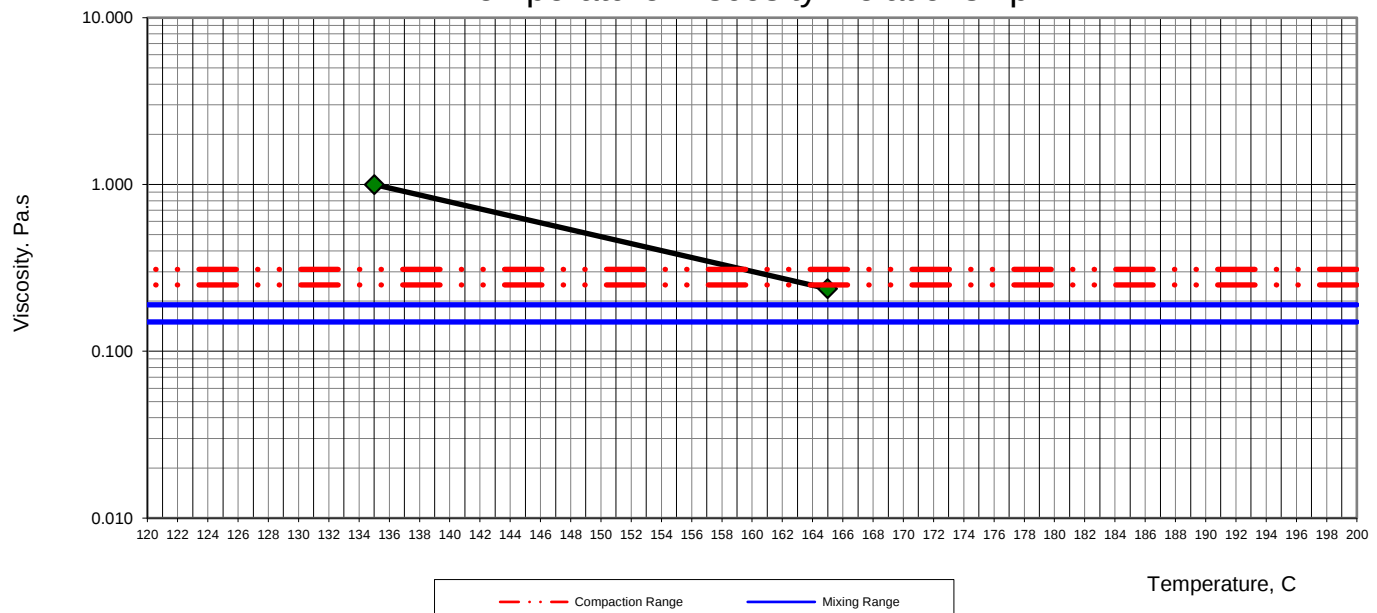
Asphalt Binder Source	60/70 Pen Grade Asphalt + 8% Crumb Rubber			
ABPG from Source	High Temperature	76	Low Temperature	-10

If the Color code of the High or Low temperature binder PG from source is RED, then modification is needed

Binder Test Results

Binder Description		PG 76-10		
Test		Test Method	Test Result	SUPERPAVE Criteria
Flash Point, C		AASHTO T 48	320+	230 C minimum
Specific Gravity, G _b		AASHTO T 228	1.026	n/a
Rotational Viscosity @	135	AASHTO T 316	1.000	3.0 Pa.s maximum
Rotational Viscosity @	165	AASHTO T 316	0.237	n/a
Select the Mixing and Compaction Temperature From the Temperature-Viscosity Relationship		Mixing temp., C	169 - 174	n/a
		Compaction temp, C	159 - 164	n/a

Temperature-Viscosity Relationship



Aggregate Data							
Summary of the Physical Properties of the Individual Aggregates							
Property	Test Method		Aggregate (samples from the hot bins)				
			Agg. # 1	Agg. # 2	Agg. # 3	Agg. # 4	Agg. # 5 (Mineral Filler)
Bulk Specific Gravity, G _{sb}	AASHTO T85 and T84		2.840	2.773	2.721	2.811	2.721
Apparent Specific Gravity, G _{sa}			2.898	2.880	2.860	2.811	2.860
Water Absorption, P _{bw} %	AASHTO T85 and T84		0.703	1.337	1.784	0.000	
Coarse Aggregate Angularity, % min.	AASHTO TP61 (ASTM D 5821)	1+ Faces	98.30	98.30			
		2+ Faces	97.00	97.00			
Fine Aggregate Angularity, % min.	AASHTO T 304				48.70	48.70	48.70
Flat & Elongated Particles, % max	ASTM D 4791		4.70	4.70			
Sand Equivalent, % min	AASHTO T 176				57.00	57.00	57.00
Soundness	AASHTO T104		4.24/4.85				
Deleterious Materials	AASHTO T112		0.12				
Toughness (LA Abrasion)	AASHTO T95		25.20				
Summary of the Aggregate Gradations							
Sieve Size		Percentage Passing					
		Samples From the Hot Bins					
mm	in	Agg. # 1	Agg. # 2	Agg. # 3	Agg. # 4	Agg. # 5	
50.0	2.0	100.0	100.0	100.0	100.00		
37.5	1.5	100.0	100.0	100.0	100.00		
25.0	1.0	100.0	100.0	100.0	100.00		
19.0	3/4	100.0	100.0	100.0	100.00		
12.5	1/2	78.1	100.0	100.0	100.00		
9.5	3/8	41.2	80.0	100.0	100.00		
4.75	No.4	13.2	28.6	98.4	100.00		
2.36	No 8	4.2	17.2	67.5	100.00		
1.18	No 16	2.1	11.3	48.3	100.00		
0.60	No 30	1.8	5.0	36.4	100.00		
0.30	No 50	1.6	3.7	22.2	99.20		
0.15	No 100	1.1	1.8	14.0	93.10		
0.075	No. 200	0.8	0.6	5.1	84.00		

Selection of DAS

Aggregate Gradation

Sieve Size raised to 0.45 power	Sieve Size		Percentage Passing				
			Samples From the Hot Bins				
	mm	in	Agg. # 1	Agg. # 2	Agg. # 3	Agg. # 4	Agg. # 5
5.81	50.0	2	100.0	100.0	100.0	100.0	0.0
5.11	37.5	1.5	100.0	100.0	100.0	100.0	0.0
4.26	25	1	100.0	100.0	100.0	100.0	0.0
3.76	19.0	3/4	100.0	100.0	100.0	100.0	0.0
3.12	12.5	1/2	78.1	100.0	100.0	100.0	0.0
2.75	9.5	3/8	41.2	80.0	100.0	100.0	0.0
2.02	4.75	No.4	13.2	28.6	98.4	100.0	0.0
1.47	2.36	No 8	4.2	17.2	67.5	100.0	0.0
1.08	1.18	No 16	2.1	11.3	48.3	100.0	0.0
0.79	0.60	No 30	1.8	5.0	36.4	100.0	0.0
0.58	0.30	No 50	1.6	3.7	22.2	99.2	0.0
0.43	0.15	No 100	1.1	1.8	14.0	93.1	0.0
0.31	0.075	No. 200	0.8	0.6	5.1	84.0	0.0

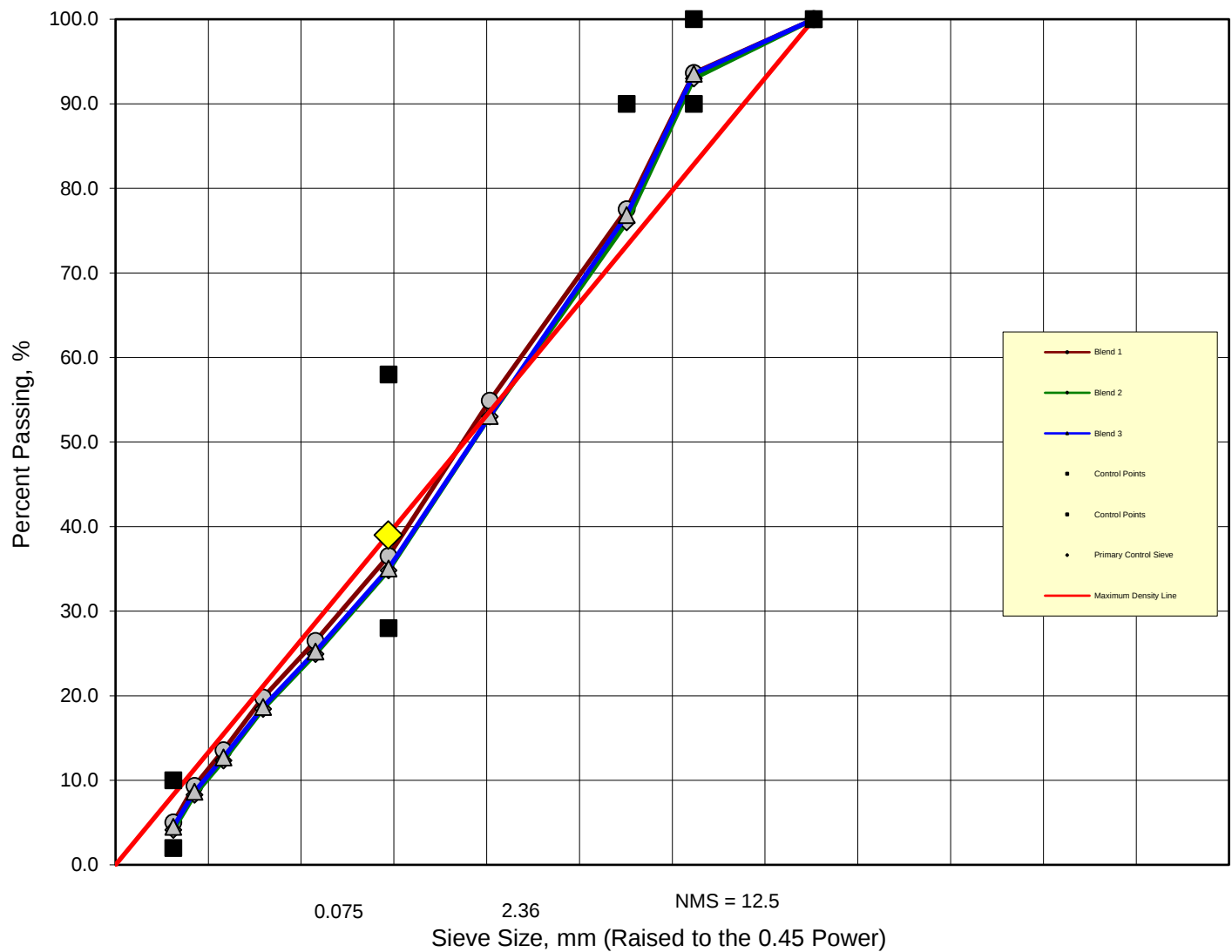
Suggested Blending Percentages

Blend #	Total	Agg. # 1	Agg. # 2	Agg. # 3	Agg. # 4	Agg. # 5
Blend 1	100.0	29.0	27.0	41.0	3.0	
Blend 2	100.0	32.0	26.0	40.0	2.0	
Blend 3	100.0	29.5	29.0	39.0	2.5	

Selection of DAS

Sieve Size raised to 0.45 power	Sieve Size in mm	SUPERPAVE Criteria, % Passing		% Passing			
		Control Points		The Primary Control Sieve			
		Min	Max	Blend 1 Blend 2 Blend 3 Remarks			
5.81	50.0			100.0	100.0	100.0	
5.11	37.5			100.0	100.0	100.0	
4.26	25.0			100.0	100.0	100.0	
3.76	19.0	100.0		100.0	100.0	100.0	100.0
3.12	12.5	90.0	100.0	93.6	93.0	93.5	94.0
2.75	9.5		90.0	77.5	76.0	76.9	78.5
2.02	4.75			54.9	53.0	53.1	56.4
1.47	2.36	28.0	58.0	36.5	34.8	35.1	38.8
1.08	1.18			26.5	24.9	25.2	29.8
0.79	0.60			19.8	18.4	18.7	22.0
0.58	0.30			13.5	12.3	12.7	14.3
0.43	0.15			9.3	8.3	8.6	9.4
0.31	0.075	2.0	10.0	5.0	4.1	4.5	4.9
Based on the PCS Criteria, the gradation of each blend is classified as				Coarse	Coarse	Coarse	

Gradation Curve for the Suggested Blends Compared to SUPERPAVE Gradation Criteria - 12.5 mm Nominal Maximum Size



Verification of the Design NMS for the Proposed Blends

Sieve Size	Blend 1	Blend 2	Blend 3	Remarks
37.5				
25.0				
19.0				
12.5	NMS	NMS	NMS	
9.5				

Estimated Combined Properties of the Blends and Comparison with Superpave Criteria

Property	SUPERPAVE Criteria		Blend 1	Blend 2	Blend 3	Remarks
Bulk Specific Gravity	G_{sb}	n/a	2.771	2.773	2.773	
Apparent Specific Gravity	G_{sa}	n/a	2.875	2.876	2.876	
Water Absorption, %	Pbw	n/a	1.296	1.286	1.291	
Coarse Aggregate Angularity, % min.	1 + Faces	95	98.3	98.3	98.3	
	Meet the Criteria ?		Yes	Yes	Yes	
	2+ Faces	90	97.0	97.0	97.0	
	Meet the Criteria ?		Yes	Yes	Yes	
Fine Aggregate Angularity, % min.	FAA	45	49.0	49.0	49.0	
	Meet the Criteria ?		Yes	Yes	Yes	
Flat & Elongated, % max	F&E	10	4.7	4.7	4.7	
	Meet the Criteria ?		Yes	Yes	Yes	
Sand Equivalent, % min	SE	45	57.0	57.0	57.0	
	Meet the Criteria ?		Yes	Yes	Yes	

Estimation of the Initial Trial Asphalt Binder % (P_{bi}) for the Trial Blends

Computed Value of		Blend 1	Blend 2	Blend 3	Remarks
Absorption Constant		0.8	0.8	0.8	
Aggregate Effective Specific Gravity, G_{se}		2.854	2.856	2.855	
Aggregate Bulk Specific Gravity, G_{sb}		2.771	2.773	2.773	
Volume of the Absorbed Binder, V_{ba}		0.0250	0.0248	0.0249	
Volume of Effective Binder, V_{be}		0.1020	0.1020	0.1020	
Percent of the initial trial asphalt binder, P_{bi}	Calculated P_{bi} Value Based on AASHTO R-35 and SP-2	5.2	5.2	5.2	
	Input the selected P_{bi} Value either from the calculation or from experience	5.0	5.0	5.0	

Summary of the Densification Data for the Trial Blends

	Blend 1		Blend 2		Blend 3	
Percent of the initial trial asphalt binder, P_{bi}	5		5		5	
Property	Sample No.					
	1	2	1	2	1	2
Height of samples at N_{ini}	128.5	129.6	128.5	129.6	129.5	129.3
Average Height of samples at N_{ini}	129.1		129.1		129.4	
Height of samples at N_{des}	115.2	115.1	114.3	114.6	115.0	114.9
Average Height of samples at N_{des}	115.2		114.5		115.0	
Weight of Sample (Oven Dry), g	4825.3	4824.7	4823.9	4826.5	4825.0	4824.2
Weight of Sample (Saturated Surface Dry), g	4843.2	4844.2	4842.9	4846.2	4844.1	4844.2
Weight of Sample in Water, g	2899.3	2896.3	2892.3	2890.0	2880.6	2887.5
Bulk Specific Gravity (G_{mb}) @ N_{des}	2.482	2.477	2.473	2.467	2.457	2.465
Average Bulk Specific Gravity (G_{mb}) @ N_{des}	2.480		2.470		2.461	
Wight of the Loose Mix, g	2201.3	2203.1	2201.5	2200.8	2201.7	2202.0
Weight of Flask With Water, g	9651.5	9651.5	9651.5	9651.5	9651.5	9651.5
Weight of Flask with Water and Loose Mix, g	10999.0	11001.2	10995.5	10996.3	10992.5	10993.3
Maximum Specific Gravity (G_{mm})	2.578	2.582	2.567	2.571	2.558	2.560
Average Maximum Specific Gravity (G_{mm})	2.580		2.569		2.559	

Determination of Volumetric Properties of the Trial Blends

Computed Value	Blend 1	Blend 2	Blend 3
% G_{mm} @ N_{ini}	85.8	85.3	85.4
% G_{mm} @ N_{des}	96.1	96.1	96.2
% Air Voids	3.9	3.9	3.8
% VMA_{ini}	15.0	15.4	15.7
Percent of the initial trial asphalt binder, P_{bi}	5.0	5.0	5.0
Calculated G_{se} from G_{mm}	2.803	2.790	2.777
% Asphalt Absorption, P_{ba}	0.422	0.220	0.064

Determination of Volumetric Properties for the Trial Blends at 4.0% Air Voids

Estimated Values	Blend 1	Blend 2	Blend 3
Estimated asphalt @ 4.0% air voids ($P_{b_{estimated}}$)	5.0	4.9	4.9
% G_{mm} @ N_{ini}	85.6	85.1	85.3
% G_{mm} @ N_{des}	96.0	96.0	96.0
% Air Voids	4.0	4.0	4.0
Voidage Constant (C)	0.1	0.1	0.1
% $VMA_{estimated}$	15.0	15.4	15.7
% $VFA_{estimated}$	73.36	74.03	74.49
Effective asphalt binder content (P_{be})	4.6	4.7	4.9
Dust Proportion (DP ratio)	1.10	0.87	0.92

Comparison of Volumetric Properties of the Trial Blends with Criteria

Computed Value	Blend 1	Blend 2	Blend 3
% G_{mm} @ N_{ini}	OK	OK	OK
% G_{mm} @ N_{des}	OK	OK	OK
% Air Voids	OK	OK	OK
% $VMA_{estimated}$	OK	OK	OK
% $VFA_{estimated}$	OK	OK	OK
Dust Proportion (DP ratio)	OK	Not OK	OK

Selection of the Design Asphalt Content (DAC)

The Selected Blend from the DAS Step is	Blend 1
Input the Following Properties of the Selected Blend	
Bulk Specific Gravity of the Selected Blend, G_{sb}	2.771
Estimated asphalt to achieve 4.0% air voids ($P_{b,estimated}$)	5.0
Percentage Passing 0.075 Sieve (N0 200) of the Selected Blend	5.0

Densification Data for the DAC

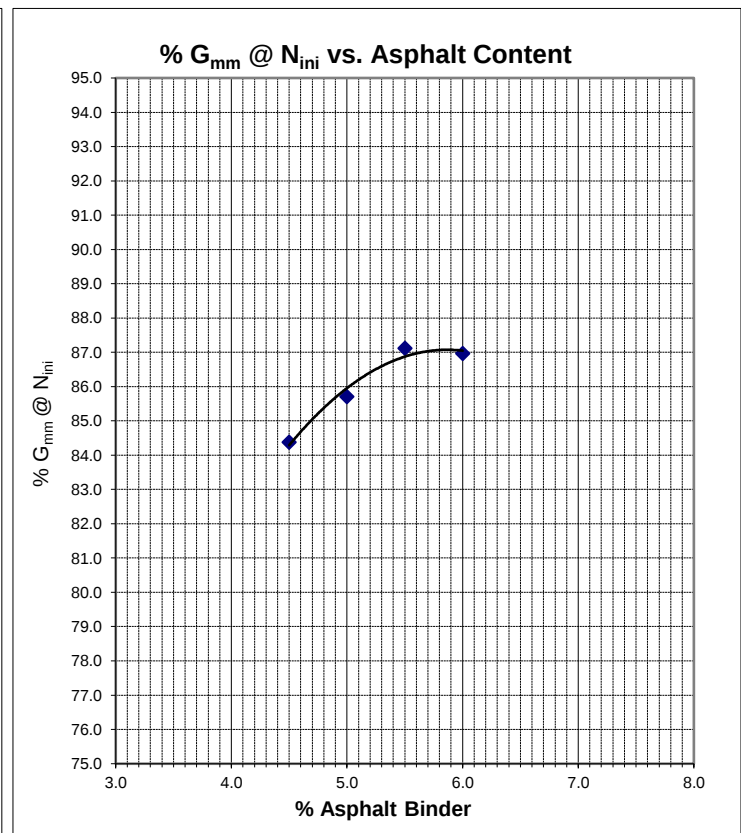
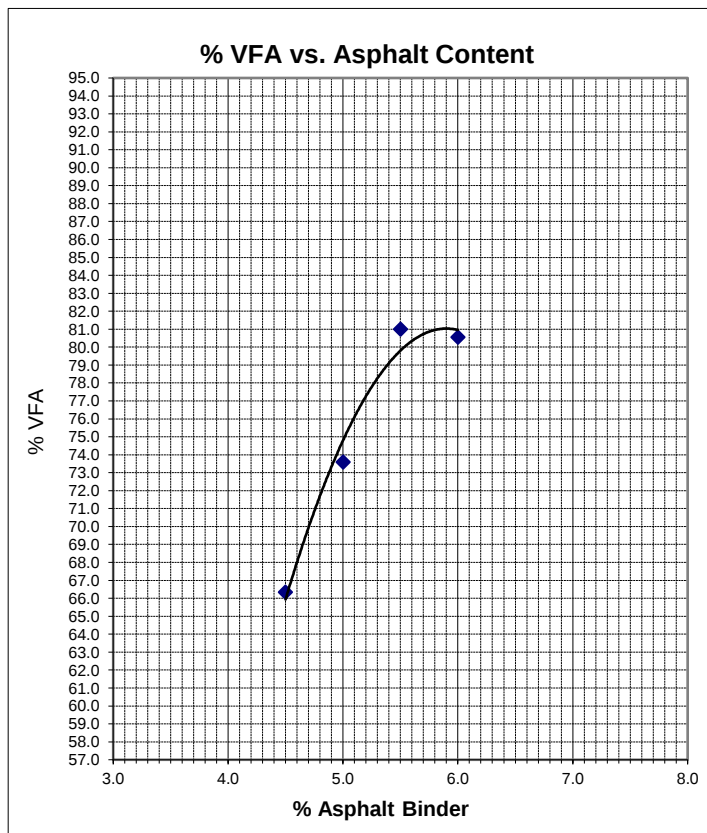
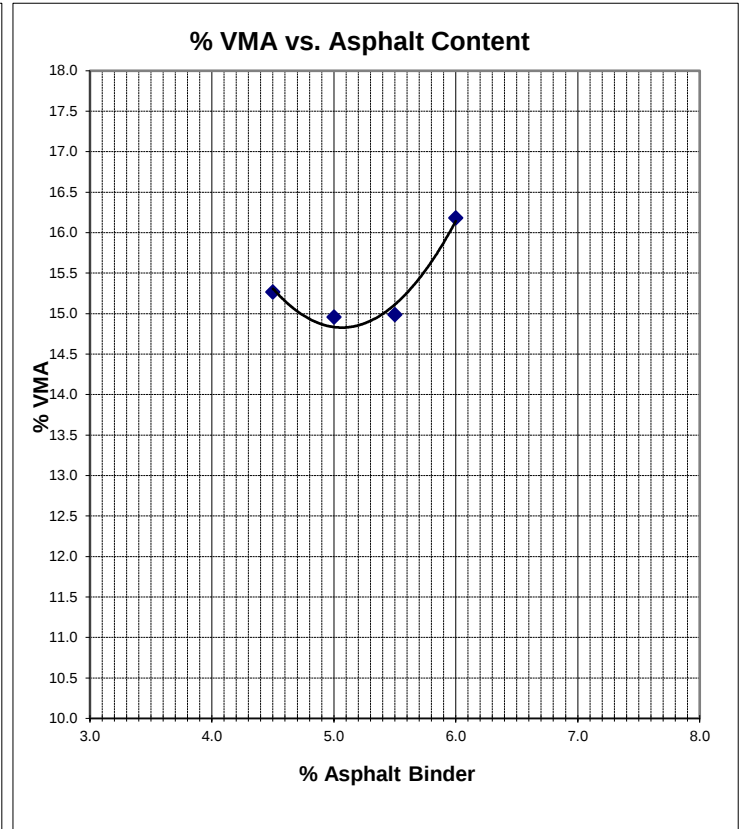
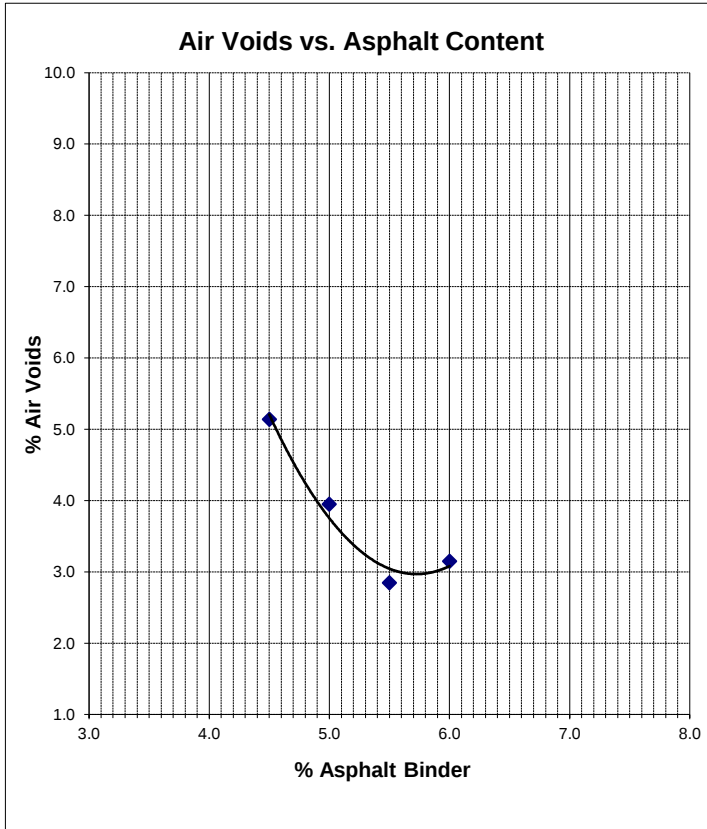
DAC Suggested Levels	4.5		5.0		5.5		6.0	
Property	Sample No.							
	1	2	1	2	1	2	1	2
Height of samples at N _{ini}	129.4	129.3	128.3	128.0	126.8	126.9	126.3	125.4
Average Height of samples at N _{ini}	129.4		128.2		126.9		125.9	
Height of samples at N _{des}	115.2	114.9	114.3	114.4	113.8	113.7	113.3	112.7
Average Height of samples at N _{des}	115.1		114.4		113.8		113.0	
Determination of G _{mb} @ N _{des}								
Weight of Sample (Oven Dry), g	4823.6	4827.4	4825.6	4822.7	4830.0	4824.7	4827.6	4831.6
Weight of Sample (Saturated Surface Dry), g	4842.6	4845.8	4839.5	4835.2	4840.1	4833.1	4831.7	4836.8
Weight of Sample in Water, g	2882.8	2880.1	2892.7	2892.3	2901.2	2899.0	2877.0	2882.1
Bulk Specific Gravity (G _{mb}) @ N _{des}	2.461	2.456	2.479	2.482	2.491	2.495	2.470	2.472
Average Bulk Specific Gravity (G _{mb}) @ N _{des}	2.459		2.480		2.493		2.471	
Determination of G _{mm}								
Wight of the Loose Mix, g	2231.6	2214.6	2228.4	2233.6	2215.7	2241.7	2244.1	2234.0
Weight of Flask With Water, g	7546.3	7546.3	7546.3	7546.3	7546.3	7546.3	7546.3	7546.3
Weight of Flask with Water and Loose Mix, g	8917.5	8905.8	8911.3	8915.5	8899.5	8913.3	8910.1	8905.2
Maximum Specific Gravity (G _{mm})	2.594	2.590	2.581	2.584	2.569	2.563	2.549	2.553
Average Maximum Specific Gravity (G _{mm})	2.592		2.582		2.566		2.551	

Determination of Volumetric Properties for the DAC

Computed Value	4.5	5.0	5.5	6.0
% G_{mm} @ N_{ini}	84.4	85.7	87.1	87.0
% G_{mm} @ N_{des}	94.9	96.1	97.2	96.9
% Air Voids	5.1	3.9	2.8	3.1
% VMA	15.3	15.0	15.0	16.2
% VFA	66.3	73.6	81.0	80.6
Calculated G_{se} from G_{mm}	2.793	2.807	2.811	2.818
% Asphalt Absorption, P_{ba}	0.29	0.47	0.53	0.62
Effective asphalt binder content (P_{be})	4.2	4.6	5.0	5.4
Dust Proportion (DP ratio)	1.18	1.10	1.00	0.92

Determination of the DAC and Verification of Volumetric Requirements of the Mix Compared to Superpave Criteria

Property		Value	Meet the Criteria ?	SUPERPAVE Criteria
DAC (Selected % Asphalt Binder Content at 4.0 air voids)		4.9	n/a	n/a
Calculated G_{se} from G_{mm}		2.807	n/a	n/a
Effective asphalt binder content (P_{be}), %		4.5	n/a	n/a
% G_{mm} @ N_{ini}		85.9	Yes	89
% G_{mm} @ N_{des}		96.0	Yes	96
% Air Voids		4.0	Yes	4
% VMA		14.7	Yes	14
				16
% VFA	Minimum	74.5	Yes	65
	Maximum			75
Dust Proportion (DP ratio)	Minimum	1.122	Yes	0.9
	Maximum			1.6



Mix Design Curves To Select the Design Asphalt Content (DAC)

Mix Deign Verification				
(1) Verification of the HMA Volumetric Properties at N _{des}				
Property			Sample #	
			1	2
Height of samples at N _{ini}			127.3	127.9
Average Height of samples at N _{ini}			127.6	
Height of samples at N _{des}			114.4	115.4
Average Height of samples at N _{des}			114.9	
Determination of G _{mb} @ N _{des}				
Weight of Sample (Oven Dry), g			4826.3	4825.8
Weight of Sample (Saturated Surface Dry), g			4843.7	4842.8
Weight of Sample in Water, g			2901.2	2897.4
Bulk Specific Gravity (G _{mb}) at N _{des}			2.485	2.481
Average Bulk Specific Gravity (G _{mb}) at N _{des}			2.483	
Determination of G _{mm}				
Wight of the Loose Mix, g			2212.3	2235.3
Weight of Flask With Water, g			9651.5	9651.5
Weight of Flask with Water and Loose Mix, g			11006.3	11022.2
Maximum Specific Gravity (G _{mm})			2.580	2.585
Average Maximum Specific Gravity (G _{mm})			2.583	
Property		Value	meet the Criteria ?	Superpave Criteria
Design Asphalt Content, %		4.9	n/a	n/a
Bulk Specific Gravity, G _{sb}		2.771	n/a	n/a
Effective Specific Gravity, G _{se}		2.802	n/a	n/a
% G _{mm} @ N _{ini}		86.6	Yes	89.0
% G _{mm} @ N _{des}		96.1	Yes	96.0
% Air Voids		3.9	Yes	4.0
% VMA		14.8	Yes	14.0
				16.0
% VFA		73.8	Yes	65.0
				75.0
Asphalt Absorption, (P _{ba})		0.405	n/a	n/a
% Passing 0.075 mm Sieve		5.00	n/a	n/a
Effective asphalt binder content (P _{be})		4.5	n/a	n/a
Dust Proportion (DP ratio)		1.11	Yes	0.90
				1.60
(2) Verification of the HMA Volumetric Properties at N _{max}				
Property			Sample #	
			1	2
Determination of G _{mb} @ N _{max}				
Weight of Sample (Oven Dry), g			4826.9	4831.4
Weight of Sample (Saturated Surface Dry), g			4832.8	4837.2
Weight of Sample in Water, g			2905.0	2904.5
Bulk Specific Gravity (G _{mb}) at N _{max}			2.504	2.500
Average Bulk Specific Gravity (G _{mb}) at N _{max}			2.502	
Property	Average	% G _{mm} @ N _{max}	Meet the Criteria ?	Superpave Criteria, Max.
Bulk Specific Gravity, G _{mb} @ N _{max}	2.502	96.9	Yes	98.0
Maximum Specific Gravity, G _{mm}	2.583			

Evaluation of Strength and Moisture Sensitivity AASHTO T283

Note: The evaluation of the moisture sensitivity of the designed Hot-Mix Asphalt is performed according to SUPERPAVE Mix Design Guidelines Approved and Issued by the Ministry of Transport.

Required SGCE (No of Gyrations) to Achieve 7.0 Air Voids (%Gmm = 93.0%) =

49

Original Samples

Property	Sample					
	Dry Set (control)			Wet-Set (Conditioned)		
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
Diameter, mm	150.00	150.00	150.00	150.00	150.00	150.00
Thickness, mm	93.4	93.0	94.2	94.6	92.8	93.3
Weight of Dry Sample in Air, g	3850.1	3849.6	3848.7	3850.3	3851.5	3853.0
Weight of SSD Sample in Air, g	3880.4	3879.2	3880.9	3879.0	3881.0	3884.5
Weight of Sample in Water, g	2270.3	2272.5	2275.6	2278.0	2280.1	2285.5
Volume	1610.1	1606.7	1605.3	1601.0	1600.9	1599.0
Bulk Specific Gravity	2.391	2.396	2.397	2.405	2.406	2.410
Maximum Specific Gravity (G_{mm})	2.583	2.583	2.583	2.583	2.583	2.583
% Air Voids	7.4	7.2	7.2	6.9	6.9	6.7
Maximum load, Newton	14754.0	14770.0	17699.0	Remarks:		
DRY Tensile Strength, kPa	670	674	797			
Average DRY Tensile Strength, kPa	714					

Conditioned 24 Hours in 60 °C Water

Thickness, mm	94.6	92.8	93.3
Maximum Load, Newton	13958.0	13854.0	13759.0
Wet Tensile Strength, kPa	626	634	626

Computation and Comparison with SUPERPAVE Criteria

Property	ITS	Tensile Strength Ratio (TSR)	Meet the Criteria ?	SUPERPAVE Criteria, % Max.
Tensile Strength of the Dry set, kPa	714	88.0%	Yes	80.0%
Tensile Strength of the Wet set, kPa	629			

Consultant Mouchel		
Project :	مشاريع امانة جدة	
Dascreption	Bituminous Wearing Course	Plant Traial
Sampled At	Raco Asphalt Plant	Sample Date
1) Bituminous Content		
TEST NO.	1	
(a) WEIGHT OF SAMPLE BEFOR TEST	2136.2	
(b) WEIGHT OF SAMPLE AFTER TEST	2023.4	
(c) WT.OF FILTER PAPER BEFORE TEST	22.1	
(d) WT.OF FILTER PAPER AFTER TEST	24.5	
(e) INCREASE IN WT. OF FILTER PAPER (d - c)	2.4	
(f) TOTAL WEIGHT OF AGGREGATE (b + e)	2025.8	
(g) WEIGHT OF BITUMINOUS MATERIAL (a - f)	110.4	
(h) ASPHALT CONTENT (g / a) * 100	5.17	
AVERAGE ASPHALT CONTENT =	5.17%	

2) Sieve Analysis

SIEVE SIZE	WT. RETAINED	CUM.WT. RETAINED	CUM.WT. PASSING	PERCENT PASSING	J M F	CONTROL POINTS
2"						
1 1/2"						
1"						
3/4"	0.0	0.0	2025.8	100.0%	100	100
1/2"	100.4	100.4	1925.4	95.0%	90--98	90-100
3/8	301.8	402.2	1623.6	80.1%	74--82	90 MAX
NO.4	477.7	879.9	1145.9	56.6%	50-60	
NO.8	322.5	1202.4	823.4	40.6%	32-42	28-58(pcs=39)
NO.16	238.4	1440.8	585.0	28.9%	23-31	
NO.30	161.2	1602.0	423.8	20.9%	16-24	
NO.50	91.2	1693.2	332.6	16.4%	10-18	
NO.100	148.9	1842.1	183.7	9.1%	7-11	
NO.200	81.2	1923.3	102.5	5.06%	3.5-6.5	2-10
PAN	4.7					
WASH	97.8					
TOTAL	2025.8					

TOTAL WEIGHT OF AGGREGATE

2025.8

WASH OVEN DRY WEIGHT

1928.0

Project :	مشاريع امانة جدة		Plant Traial
Description :	Bituminous Wearing Course		Sample Date:
Sampled At:	Raco Asphalt Plant		
BITUMINOUS Wearing COUESE SUPERPAVE			
Property	Sample #		
	1	2	
Height of samples at N _{ini}	124.3	126.3	
Average Height of samples at N _{ini}		125.3	
Height of samples at N _{des}	112.6	114.0	
Average Height of samples at N _{des}		113.3	
Determination of G _{mb} @ N _{des}			
Weight of Sample (Oven Dry), g	4828.3	4832.5	
Weight of Sample (Saturated Surface Dry), g	4842.3	4846.9	
Weight of Sample in Water, g	2897.8	2900.0	
Bulk Specific Gravity (G _{mb}) at N _{des}	2.483	2.482	
Average Bulk Specific Gravity (G _{mb}) at N _{des}		2.483	
Determination of G _{mm}			
Wight of the Loose Mix, g	2185.3	2178.9	
Weight of Flask With Water, g	9652.1	9652.1	
Weight of Flask with Water and Loose Mix, g	10992.3	10986.6	
Maximum Specific Gravity (G _{mm})	2.586	2.580	
Average Maximum Specific Gravity (G _{mm})		2.583	
	Value	meet the Criteria ?	Superpave Criteria
Asphalt Content, %	5.17	n/a	n/a
bitumen spesific gravity , G _b	1.026	n/a	n/a
Bulk Specific Gravity, G _{sb}	2.771	n/a	n/a
Effective Specific Gravity, G _{se}	2.816	n/a	n/a
% G _{mm} @ N _{ini} (G _{mb} /G _{mm}) *H _{des} /H _{ini}	86.9	Yes	89.0
% G _{mm} @ N _{des} G _{mb} /G _{mm}	96.1	Yes	96.0
% Air Voids (G _{mm} -G _{mb})/G _{mm}	3.9	Yes	4.0
% VMA 100-(G _{mb} *P _s)/G _{sb}	15.0	Yes	14.0
			16.0
% VFA (G _{mb} *P _{be} /G _b)*100/VMA	74.12	Yes	65.0
			75.0
Asphalt Absorption, (P _{ba}) (G _{se} -G _{sb})/(G _{sb} *G _{se})*G _b *100	0.59	n/a	n/a
% Passing 0.075 mm Sieve	5.06%	n/a	n/a
Effective asphalt binder content (P _{be}) Pb-((100-Pb)*(P _{ba} /100))	4.6%	n/a	n/a
Dust Proportion (DP ratio) %Passing # 200/(P _{be})	1.10	Yes	0.80
			1.60
(2) Verification of the HMA Volumetric Properties at N _{max}			
Property	Sample #		
	1	2	
Determination of G _{mb} @ N _{max}			
Weight of Sample (Oven Dry), g	4824.1	4826.9	
Weight of Sample (Saturated Surface Dry), g	4830.7	4832.1	
Weight of Sample in Water, g	2889.9	2888.9	
Bulk Specific Gravity (G _{mb}) at N _{max}	2.486	2.484	
Average Bulk Specific Gravity (G _{mb}) at N _{max}		2.485	
Property	Average	% G _{mm} @ N _{max}	Meet the Criteria ?
Bulk Specific Gravity, G _{mb} @ N _{max}	2.485	96.2	Yes
Maximum Specific Gravity, G _{mm}	2.583		
			Superpave Criteria, MAX.
			98.0

Start Of Test : Sunday, November 03, 2019 14:07:22

Parameter File : c:\documents and settings\all users\application data\bohlin\rotational\asphalt tests\rtfo g

Description : RTFO Binder Grade

Sample Reference : none

Measuring System : PP 25 DSR

Gap Setting : 1.000 mm

Parameter Summary :

No. Test Runs : 1

Temp Mode : ISOTHERMAL 64.0 °C

Thermal Equilibrium Time : 600.00 s

Pre-Shear : OFF

Shear mode : Controlled Stress

Oscillation Mode: Grade Sample Mode : (R)TFOT

Frequency : 10.0 rad/s No. Samples : 1

Target Strain : 10.0 %

Temperature : 64.0 °C

Thermal Equilibrium Time : 600 s

Time	Temperature	Frequency	Phase Angle	Complex Modulus	Elastic Modulus	Viscous Modulus	Complex Viscosity	Shear Stress	Strain
t (s)	T (°C)	f (Hz)	δ (°)	G^* (Pa)	G' (Pa)	G'' (Pa)	η^* (Pas)	σ (Pa)	γ ()
26.7760	76.02	1.5957e+00	80.28	3.3364e+03	5.6312e+02	3.2886e+03	3.3277e+02	3.3494e+02	1.005422e-01
26.8044	81.99	1.5957e+00	78.46	1.7247e+03	3.4497e+02	1.6898e+03	1.7201e+02	1.7277e+02	1.005247e-01

Final Results :

Pass Fail Temp : 80.0 °C

Grade : 76

Temperature : 76.0 °C

$G^*/\sin(\delta)$: 3.385 kPa

Result : Pass

Temperature : 82.0 °C

Start Of Test : Saturday, November 02, 2019 23:23:37

Parameter File : c:\documents and settings\all users\application data\bohlin\rotational\asphalt tests\ob gr

Description : Original Binder Grade

Sample Reference : none

Measuring System : PP 25 DSR

Gap Setting : 1.000 mm

Parameter Summary :

No. Test Runs : 1

Temp Mode : ISOTHERMAL 64.0 °C

Thermal Equilibrium Time : 600.00 s

Pre-Shear : OFF

Shear mode : Controlled Stress

Oscillation Mode: Grade Sample Mode : OB

Frequency : 10.0 rad/s No. Samples : 1

Target Strain : 12.0 %

Temperature : 64.0 °C

Thermal Equilibrium Time : 600 s

Time	Temperature	Frequency	Phase Angle	Complex Modulus	Elastic Modulus	Viscous Modulus	Complex Viscosity	Shear Stress	Strain
t (s)	T (°C)	f (Hz)	δ (°)	G^* (Pa)	G' (Pa)	G'' (Pa)	η^* (Pas)	σ (Pa)	γ ()
26.8248	76.05	1.5957e+00	81.57	1.5842e+03	2.3234e+02	1.5671e+03	1.5801e+02	1.9002e+02	1.202658e-01
26.7938	81.94	1.5957e+00	78.94	8.8151e+02	1.6905e+02	8.6515e+02	8.7919e+01	1.0546e+02	1.203791e-01

Final Results :

Pass Fail Temp : 80.8 °C

Grade : 76

Temperature : 76.1 °C

$G^*/\sin(\delta)$: 1.6016 kPa

Result : Pass

Temperature : 81.9 °C



CLAY LUMPS AND FRIABLE PARTICLES

MRDTM - 312 , AASHTO T - 112

Project: مشاريع امانة محافظة جدة

Description: Samples Form Hot Bin

Sampled At: Asphalt Plant

SIEVE SIZE		ORIGINAL GRADING %	WT. OF TEST SAMPLE	AFTER TEST SIEVE SIZE	RETAINED MASS g	PASSING MASS g	PERCENT CLAY	WEIGHTED PER. CLAY
PASSING	RETAINED	A	B	C	D	E	F	G
1"	3/4"	0.0	2500.1	No. 4	2495.3	4.8	0.19	0.0000
3/4"	3/8"	22.5	2501.3	No.4	2496.9	4.4	0.18	0.0396
3/8"	NO 4	22.6	2500.4	No.8	2495.5	4.9	0.20	0.0443
NO 4	NO 8	18.4	1500.8	No.16	1496.8	4.0	0.27	0.0490
TOTAL		63.5						TOTAL
								0.1329

Clay Lumps Corrected for 100% = 0.21 Specified Loss%= 0.25 Max.

REMARKS:

M.E Contractor



Project: مشاريع امانة محافظة جدة
Description: Hot Bin Samples
Sampled at: Asphalt Plant

DETERMINATION OF PERCENTAGE OF CRUSHED AGGREGATE

CRUSHED FRACTION DETERMINATION

Passing	Retained	Test Mass (A)	Crushed Mass (B)	Percent Crushed
3/4"	3/8"	2600.4	2516.6	96.8
3/8"	#4	2251.0	2215.7	98.4

CALCULATIONS

Passing	Retained	Test Portion %	Percent Crushed	Weighted % Crushed
3/4"	3/8"	21.5	96.8	20.81
3/8"	#4	22.1	98.4	21.75
Total		43.6		42.6

Total Test Portion % (C) = 43.6
Total Weighted % Crushed (D) = 42.6
Weighted Average Percent Crushed Particles = $D/C \times 100 = 97.6\%$
Specified for One Face Crushed = 95.0 % Min

M.EContractor



Project: مشاريع امانة محافظة جدة
Description: Samples Form Hot Bin
Sampled At: Asphal Plant

UNCOMPACTED VOID CONTENT OF FINE AGGREGATES

(AASHTO T 304-96)

Calibrated Volume of Cylinder:

V = 101 ml.

Specific Gravity of Aggregate:

G = 2.685

Method A: Standard Graded Sample

Ret. on Sieve	Mass (g)
No. 16	44
No. 30	57
No. 50	72
No. 100	17
	190 ± 0.2

Determination no.	1	2
Weight of Empty Cylinder(W_1) gms.	246.9	246.9
Weight of Cylinder with Loose Aggregate(W_2) gms.	388.2	389.8
Weight of Loose Aggregate, $F=(W_2-W_1)$ gms.	141.3	142.9
Uncompacted Void Content, $U=((V-F/G)/V)100$, %	47.9	47.3
Average:	47.6	ok

Remarks: Specified limit $\geq 45\%$.



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # 4

Source: RACO Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	3177
Loose					Oven Dry,g	3177
Rodded					Wash Oven Dry,g	3025
M.Contaent =					Washing Loss,g	152
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"	0	3177				
1 1/2"	0	3177			100.0	
1"	0	3177			100.0	
3/4"	0	3177			100.0	
1/2"	0	3177			100.0	
3/8"	0	3177			100.00	
#4	70	3107			97.80	
#8	985	2122			66.80	
#16	591	1531			48.20	
#30	400	1131			35.60	
#50	438	693			21.80	
#100	229	464			14.60	
#200	308	156			4.90	
Pan	4					
Wash 200	152					
Total	3177					

M.E Controctor:



SIEVE ANALYSIS						
(AASHTO T-27/ASTM C-136)						
Sample Description : Bin # 4						
Source: RACO Asphalt PLANT						
				WEIGHT OF SAMPLE IN GRAMS		
DRY UNIT WT gm/cc				Original,g	3042	
Loose				Oven Dry,g	3042	
Rodded				Wash Oven Dry,g	2883	
M.Contaent =				Washing Loss,g	159	
Fineness =				Cumulative		
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"	0	3042				
1 1/2"	0	3042			100.0	
1"	0	3042			100.0	
3/4"	0	3042			100.0	
1/2"	0	3042			100.0	
3/8"	0	3042			100.00	
#4	27	3015			99.10	
#8	958	2056			67.60	
#16	566	1491			49.00	
#30	380	1110			36.50	
#50	435	675			22.20	
#100	265	411			13.50	
#200	249	161			5.30	
Pan	2					
Wash 200	159					
Total	3042					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # 4

Source: RACO Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Original,g 3162

Loose

Oven Dry,g 3162

Rodded

Wash Oven Dry,g 3004

M.Contaent =

Washing Loss,g 158

Fineness =

Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
					100	
2"	0	3162				
1 1/2"	0	3162			100.0	
1"	0	3162			100.00	
3/4"	0	3162			100.00	
1/2"	0	3162			100.00	
3/8"	0	3162			100.00	
#4	54	3108			98.30	
#8	955	2153			68.10	
#16	642	1511			47.80	
#30	338	1173			37.10	
#50	458	715			22.60	
#100	275	440			13.90	
#200	278	161			5.10	
Pan	3					
Wash 200	158					
Total	3162					

M.E Controctor:



SIEVE ANALYSIS

Sample Description : Bin #4

Source: RACO Asphalt PLANT

Sieve Size	Cumulative Percent Passing	Cumulative Percent Passing	Cumulative Percent Passing	AVG	Governing Specs.
				Percent Passing	
2"					
1 1/2"					
1"					
3/4"	100.0	100.0	100.0	100.0	
1/2"	100.0	100.0	100.0	100.0	
3/8"	100.0	100.0	100.0	100.0	
#4	97.8	99.1	98.3	98.4	
#8	66.8	67.6	68.1	67.5	
#16	48.2	49.0	47.8	48.3	
#30	35.6	36.5	37.1	36.4	
#50	21.8	22.2	22.6	22.2	
#100	14.6	13.5	13.9	14.0	
#200	4.9	5.3	5.1	5.1	
Pan					
Wash 200					
Total					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 1/2 "

Source: Minahy Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Original,g 3333

Loose

Oven Dry,g 3333

Rodded

Wash Oven Dry,g 3316

M.Contaent =

Washing Loss,g 17

Fineness =

Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
					100	
2"	0	3333				
1 1/2"	0	3333			100.0	
1"	0	3333			100.0	
3/4"	0	3333			100.0	
1/2"	0	3333			100.0	
3/8"	640	2693			80.8	
#4	1786	907			27.2	
#8	340	567			17.0	
#16	193	373			11.2	
#30	213	160			4.8	
#50	45	115			3.5	
#100	65	50			1.5	
#200	30	20			0.6	
Pan	3					
Wash 200	17					
Total	3333					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 1/2 "

Source: Minahy Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	3164
Loose					Oven Dry,g	3164
Rodded					Wash Oven Dry,g	3150
M.Contaent =					Washing Loss,g	14
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"	0	3164				
1 1/2"	0	3164			100.0	
1"	0	3164			100.0	
3/4"	0	3164			100.0	
1/2"	0	3164			100.0	
3/8"	626	2538			80.2	
#4	1633	905			28.6	
#8	367	538			17.0	
#16	190	348			11.0	
#30	180	168			5.3	
#50	52	116			3.7	
#100	49	66			2.1	
#200	51	16			0.5	
Pan	2					
Wash 200	14					
Total	3164					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 1/2 "

Source: Minahy Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Original,g 3242

Loose

Oven Dry,g 3242

Rodded

Wash Oven Dry,g 3222

M.Contaent =

Washing Loss,g 20

Fineness =

Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
2"	0	3242				
1 1/2"	0	3242			100.0	
1"	0	3242			100.00	
3/4"	0	3242			100.00	
1/2"	0	3242			100.00	
3/8"	681	2561			79.00	
#4	1589	973			30.00	
#8	402	571			17.60	
#16	195	376			11.60	
#30	214	162			5.00	
#50	32	130			4.00	
#100	71	58			1.80	
#200	36	23			0.70	
Pan	2					
Wash 200	20					
Total	3242					

M.E Controctor:



SIEVE ANALYSIS

AVG PASSING PERCENT

Sample Description : Bin 1/2 "

Source: Minahy Asphalt PLANT

Sieve Size	Cumulative Percent Passing	Cumulative Percent Passing	Cumulative Percent Passing	AVG	Governing Specs.
				Percent Passing	
2"					
1 1/2"					
1"	100.0	100.0	100.0	100.0	
3/4"	100.0	100.0	100.0	100.0	
1/2"	100.00	100.00	100.00	100.0	
3/8"	80.80	80.20	79.00	80.0	
#4	27.20	28.60	30.00	28.6	
#8	17.00	17.00	17.60	17.2	
#16	11.20	11.00	11.60	11.3	
#30	4.80	5.30	5.00	5.0	
#50	3.45	3.66	4.00	3.7	
#100	1.50	2.10	1.80	1.8	
#200	0.60	0.50	0.70	0.6	
Pan					
Wash 200					
Total					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 3/4 "

Source: RACO Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Loose

Rodded

M.Contaent =

Fineness =

Original,g 3574

Oven Dry,g 3574

Wash Oven Dry,g 3552

Washing Loss,g 22

Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
					100	
2"	0	3574				
1 1/2"	0	3574			100.0	
1"	0	3574			100.0	
3/4"	0	3574			100.0	
1/2"	829	2745			76.8	
3/8"	1265	1480			41.40	
#4	986	493			13.80	
#8	340	154			4.30	
#16	75	79			2.20	
#30	14	64			1.80	
#50	7	57			1.60	
#100	18	39			1.10	
#200	14	25			0.70	
Pan	3					
Wash 200	22					
Total	3574					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 3/4 "

Source: RACO Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	3614
Loose					Oven Dry,g	3614
Rodded					Wash Oven Dry,g	3588
M.Contaent =					Washing Loss,g	26
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"	0	3614				
1 1/2"	0	3614			100.0	
1"	0	3614			100.0	
3/4"	0	3614			100.0	
1/2"	744	2870			79.4	
3/8"	1424	1446			40.00	
#4	972	473			13.10	
#8	329	145			4.00	
#16	61	83			2.30	
#30	14	69			1.90	
#50	7	61			1.70	
#100	18	43			1.20	
#200	14	29			0.80	
Pan	3					
Wash 200	26					
Total	3614					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 3/4 "

Source: RACO Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Loose

Rodded

M.Contaent =

Fineness =

Original,g 3425

Oven Dry,g 3425

Wash Oven Dry,g 3396

Washing Loss,g 29

Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
					100	
2"	0	3425				
1 1/2"	0	3425			100.0	
1"	0	3425			100.00	
3/4"	0	3425			100.00	
1/2"	750	2675			78.10	
3/8"	1230	1445			42.20	
#4	1010	435			12.70	
#8	288	147			4.30	
#16	86	62			1.80	
#30	3	58			1.70	
#50	7	51			1.50	
#100	17	34			1.00	
#200	3	31			0.90	
Pan	2					
Wash 200	29					
Total	3425					

M.E Controctor:



SIEVE ANALYSIS

AVG PASSING PERCENT

Sample Description : Bin 3/4 "

Source: RACO Asphalt PLANT

Sieve Size	Cumulative Percent Passing	Cumulative Percent Passing	Cumulative Percent Passing	AVG Percent Passing	Governing Specs.
2"					
1 1/2"					
1"					
3/4"	100.0	100.0	100.0	100.0	
1/2"	76.80	79.40	78.10	78.10	
3/8"	41.40	40.00	42.20	41.20	
#4	13.80	13.10	12.70	13.20	
#8	4.30	4.00	4.30	4.20	
#16	2.20	2.30	1.80	2.10	
#30	1.80	1.90	1.70	1.80	
#50	1.60	1.70	1.50	1.60	
#100	1.10	1.20	1.00	1.10	
#200	0.70	0.80	0.90	0.80	
Pan					
Wash 200					
Total					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # Fillerr

Source: RACO Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	100
Loose					Oven Dry,g	100
Rodded					Wash Oven Dry,g	17
M.Contaent =					Washing Loss,g	83
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"						
1 1/2"						
1"						
3/4"						
1/2"						
3/8"						
#4						
#8						
#16	0	100			100.00	
#30	0	100			100.00	
#50	1	99			99.20	
#100	6	94			93.70	
#200	10	84			84.20	
Pan	1					
Wash 200	83					
Total	100					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # Fillerr

Source: RACO Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	100
Loose					Oven Dry,g	100
Rodded					Wash Oven Dry,g	17
M.Contaent =					Washing Loss,g	83
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"						
1 1/2"						
1"						
3/4"						
1/2"						
3/8"						
#4						
#8						
#16						
#30	0	100			100.00	
#50	1	99			99.00	
#100	6	94			93.50	
#200	10	84			83.60	
Pan	1					
Wash 200	83					
Total	100					

M.E Controctor:



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # Fillerr

Source: RACO Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Original,g 100

Loose

Oven Dry,g 100

Rodded

Wash Oven Dry,g 17

M.Contaent =

Washing Loss,g 83

Fineness =

Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
					100	
2"						
1 1/2"						
1"						
3/4"						
1/2"						
3/8"						
#4						
#8						
#16						
#30	0	100			100.00	
#50	1	99			99.40	
#100	7	92			92.10	
#200	8	84			84.20	
Pan	1					
Wash 200	83					
Total	100					

M.E Controctor:



SIEVE ANALYSIS

Sample Description : Bin # Fillerr

Source: RACO Asphalt PLANT

Sieve Size	Cumulative Percent Passing	Cumulative Percent Passing	Cumulative Percent Passing	AVG	Governing Specs.
				Percent Passing	
2"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
#4					
#8					
#16					
#30	100.00	100.00	100.00	100.00	
#50	99.20	99.00	99.40	99.20	
#100	93.70	93.50	92.10	93.10	
#200	84.20	83.60	84.20	84.00	
Pan					
Wash 200					
Total					

M.E Controctor:



ABRASION OF COARSE AGGREGATE

By the use of Los Angeles machine

Project: مشاريع امانة محافظة جدة
 Description: Blended Hot Bin
 Sampled at: Asphalt Plant

TYPE OF GRADING					
SIEVE ANALYSIS		WEIGHT AND GRADING OF TEST SAMPLE, gm.			
PASSING	RETAINED	A	B	C	D
1-1/2"	1"	1250			-
1"	3/4"	1250			-
3/4"	1/2"	1250	2500		-
1/2"	3/8"	1250	2500		-
3/8"	1/4"	-	-	2500	-
1/4"	NO. 4	-	-	2500	-
NO. 4	NO. 8	-	-	-	5000
Total wt. of Sample, gm.		5000	5000	5000	5000
Abrasive Charges (No. of Spheres)		12	11	8	6

(a) Weight of sample before test = 5000 gm

(b) Weight of sample after 500 rev. retained on No.12 seive = 3570 gm

(c) Percentage of wear = $100 \times [(a - b) / a]$ = 28.6 %

REMARKS: Specified % Loss= 40 Max.
 Grading B is tested.

Contractor



ABRASION OF COARSE AGGREGATE

By the use of Los Angeles machine

Project: مشاريع امانة محافظة جدة

Description: Blended Hot Bin

Sampled at: Asphalt Plant

TYPE OF GRADING					
SIEVE ANALYSIS		WEIGHT AND GRADING OF TEST SAMPLE, gm.			
PASSING	RETAINED	A	B	C	D
1-1/2"	1"	1250			-
1"	3/4"	1250			-
3/4"	1/2"	1250	2500		-
1/2"	3/8"	1250	2500		-
3/8"	1/4"	-	-	2500	-
1/4"	NO. 4	-	-	2500	-
NO. 4	NO. 8	-	-	-	5000
Total wt. of Sample, gm.		5000	5000	5000	5000
Abrasive Charges (No. of Spheres)		12	11	8	6

(a) Weight of sample before test = 5002 gm

(b) Weight of sample after 500 rev. retained on No.12 seive = 3512 gm

(c) Percentage of wear = $100 \times [(a - b) / a]$ = 29.78 %

REMARKS: Specified % Loss= 40 Max.
Grading C is tested.

Contractor



ABRASION OF COARSE AGGREGATE

By the use of Los Angeles machine

Project: مشاريع امانة محافظة جدة

Description: Blended Hot Bin

Sampled at: Asphalt Plant

TYPE OF GRADING					
SIEVE ANALYSIS		WEIGHT AND GRADING OF TEST SAMPLE, gm.			
PASSING	RETAINED	A	B	C	D
1-1/2"	1"	1250			-
1"	3/4"	1250			-
3/4"	1/2"	1250	2500		-
1/2"	3/8"	1250	2500		-
3/8"	1/4"	-	-	2500	-
1/4"	NO .4	-	-	2500	-
NO. 4	NO. 8	-	-	-	5000
Total wt. of Sample, gm.		5000	5000	5000	5000
Abrasive Charges (No. of Spheres)		12	11	8	6

(a) Weight of sample before test = 5000 gm

(b) Weight of sample after 500 rev. retained on No.12 seive = 3333 gm

(c) Percentage of wear = $100 \times [(a - b) / a]$ = 33.3 %

REMARKS: Specified % Loss= 40 Max.

Grading D is tested.

Contractor



ABRASION OF COARSE AGGREGATE

By the use of Los Angeles machine

Project: مشاريع امانة محافظة جدة
Description: Blended Hot Bin
Sampled at: Asphalt Plant

ABRASION OF COARSE AGGREGATE BY USE OF THE LOS ANGELES MACHINE.

SAMMARY

	B	C	D	AVERAGE
PERCENTAGE OF WEAR	28.6	29.8	33.3	30.6

REMARKS: Specification Required - 40 % Maximum

Contractor



SOUNDNESS OF AGGREGATE BY USE OF SODIUM SULPHATE

MRDTM - 311, AASHTO T - 104

Project: مشاريع امانة جدة
Description: Samples Form Hot Bin
Sampled At: Asphalt Plant

Coarse Aggregate

SIEVE SIZE		ORIGINAL GRADING %	WT. OF TEST SAMPLE	AFTER TEST SIEVE SIZE	RETAINED MASS g	PASSING MASS g	Passing Mass %	WEIGHTED PER.Mass
PASSING	RETAINED	A	B	C	D	E	F	G
3/4"	3/8"	21.5	1002.1	5/16"	971.6	30.5	3.04	0.65
3/8"	No.4	22.1	500.2	No. 5	472.0	28.2	5.64	1.25
TOTAL		43.60						1.90

Loss Corrected for 100%= 4.36 Specified Loss %= 10.0 Max.

Fine Aggregate

SIEVE SIZE		ORIGINAL GRADING %	WT. OF TEST SAMPLE	AFTER TEST SIEVE SIZE	RETAINED MASS g	PASSING MASS g	Passing Mass %	WEIGHTED PER.Mass
PASSING	RETAINED	A	B	C	D	E	F	G
No: 4	No: 8	17.6	101.3	No. 8	98.2	3.1	3.06	0.54
No: 8	No: 16	9.0	100.5	No. 16	95.8	4.7	4.68	0.42
No:16	No:30	7.8	101.8	No. 30	96.3	5.5	5.40	0.42
No:30	No: 50	7.7	100.4	No. 50	98.0	2.4	2.39	0.18
TOTAL		42.10						1.56

Loss Corrected for 100%= 3.72 Specified Loss %= 10.0 Max.

REMARKS: Sodium Sulphate Solution was used for test with sp.gr of 1.162

M.E Contractor



SPECIFIC GRAVITY AND ABSORPTION OF AGGREGATES

MRDTM 304 & 305 , AASHTO T- 84 & 85

COARSE AGGREGATE

Project: : مشاريع امانة جدة
Description: 3/4" Agg .From Hot Bin
Sampled At: Asphal Plant

Description	1	2	Average
1. Weight of saturated surface dry sample in air (gm)	4154.5	4135.3	
2. Weight of Oven dry sample in air (gm)	4125.3	4106.6	
3. Weight of saturated surface dry sample in water (gm)	2701.3	2690.0	
4. Absorption = Line1 - Line 2, (gm)	29.2	28.7	
5. % Absorption = Line 4/Line 2 * 100	0.708	0.699	0.703
6. Specific Gravity:			
(a) Bulk, Oven-dry =Line 2/(Line1 - Line 3)	2.839	2.841	2.840
(b) Bulk, sat.surf.dry =Line1/(Line1 - Line 3)	2.859	2.861	2.860
(c) Apparent = Line 2/(Line2 - Line 3)	2.897	2.899	2.898

FINE AGGREGATE

Project: _____ Sample No: _____
Description: _____ Sampled by: _____
Sampled At: _____ Date sampled: _____

Description	1	2	Average
7. Weight of saturated surface dry sample (gm)			
8. Weight of Oven dry sample (gm)			
9. Weight of bottle filled with water (gm)			
10. Wt. Of bottle with sat.surf.dry sample & water (gm)			
11. Absorption = (Line 7 - Line 8)			
12. % Absorption = Line 11/Line8 * 100			
13. Specific Gravity:			
(a) Bulk, Oven-dry =Line 8 / (Line 7+Line 9-Line 10)			
(b) Bulk, sat.surf.dry =Line7 / (Line 7+Line 9 - Line 10)			
(c) Apparent = Line 8 / (Line 8 + line 9 - Line 10)			

M.E Contractor



SPECIFIC GRAVITY AND ABSORPTION OF AGGREGATES

MRDTM 304 & 305 , AASHTO T- 84 & 85

COARSE AGGREGATE

Project: : مشاريع امانة جدة
Description: 1/2" Agg .From Hot Bin
Sampled At: Asphalt Plant

Description	1	2	Average
1. Weight of saturated surface dry sample in air (gm)	3063.6	3152.5	
2. Weight of Oven dry sample in air (gm)	3023.0	3111.1	
3. Weight of saturated surface dry sample in water (gm)	1972.4	2032.0	
4. Absorption = Line1 - Line 2, (gm)	40.6	41.4	
5. % Absorption = Line 4/Line 2 * 100	1.343	1.330	1.337
6. Specific Gravity:			
(a) Bulk, Oven-dry =Line 2/(Line1 - Line 3)	2.770	2.777	2.773
(b) Bulk, sat.surf.dry =Line1/(Line1 - Line 3)	2.808	2.813	2.811
(c) Apparent = Line 2/(Line2 - Line 3)	2.877	2.883	2.880

FINE AGGREGATE

Project: _____ Sample No: _____
Description: _____ Sampled by: _____
Sampled At: _____ Date sampled: _____

Description	1	2	Average
7. Weight of saturated surface dry sample (gm)			
8. Weight of Oven dry sample (gm)			
9. Weight of bottle filled with water (gm)			
10. Wt. Of bottle with sat.surf.dry sample & water (gm)			
11. Absorption = (Line 7 - Line 8)			
12. % Absorption = Line 11/Line8 * 100			
13. Specific Gravity:			
(a) Bulk, Oven-dry =Line 8 / (Line 7+Line 9-Line 10)			
(b) Bulk, sat.surf.dry =Line7 / (Line 7+Line 9 - Line 10)			
(c) Apparent = Line 8 / (Line 8 + line 9 - Line 10)			

M.E Contractor



SPECIFIC GRAVITY AND ABSORPTION OF AGGREGATES

MRDTM 304 & 305 , AASHTO T- 84 & 85

COARSE AGGREGATE

Project: : مشاريع امانة جدة
Description: Crushed sand
Sampled At: Asphalt Plant

Description	1	2	Average
1. Weight of saturated surface dry sample in air (gm)			
2. Weight of Oven dry sample in air (gm)			
3. Weight of saturated surface dry sample in water (gm)			
4. Absorption = Line1 - Line 2, (gm)			
5. % Absorption = Line 4/Line 2 * 100			
6. Specific Gravity:			
(a) Bulk, Oven-dry =Line 2/(Line1 - Line 3)			
(b) Bulk, sat.surf.dry =Line1/(Line1 - Line 3)			
(c) Apparent = Line 2/(Line2 - Line 3)			

FINE AGGREGATE

Project: مشاريع امانة جدة
Description: Crushed sand from hot bin
Sampled At: Asphalt Plant

Description	1	2	Average
7. Weight of saturated surface dry sample (gm)	504.2	505.6	
8. Weight of Oven dry sample (gm)	495.3	496.8	
9. Weight of bottle filled with water (gm)	703.7	703.7	
10. Wt. Of bottle with sat.surf.dry sample & water (gm)	1025.8	1026.8	
11. Absorption = (Line 7 - Line 8)	8.9	8.8	
12. % Absorption = Line 11/Line8 * 100	1.797	1.771	1.784
13. Specific Gravity:			
(a) Bulk, Oven-dry =Line 8 / (Line 7+Line 9-Line 10)	2.720	2.722	2.721
(b) Bulk, sat.surf.dry =Line7 / (Line 7+Line 9 - Line 10)	2.769	2.770	2.770
(c) Apparent = Line 8 / (Line 8 + line 9 - Line 10)	2.860	2.860	2.860

M.E Contractor



SPECIFIC GRAVITY AND ABSORPTION OF AGGREGATES

MRDTM 304 & 305 , AASHTO T- 84 & 85

COARSE AGGREGATE

Project: : مشاريع امانة جدة
Description: Filler
Sampled At: Asphalt plant

Description	1	2	Average
1. Weight of saturated surface dry sample in air (gm)			
2. Weight of Oven dry sample in air (gm)			
3. Weight of saturated surface dry sample in water (gm)			
4. Absorption = Line1 - Line 2, (gm)			
5. % Absorption = Line 4/Line 2 * 100			
6. Specific Gravity:			
(a) Bulk, Oven-dry =Line 2/(Line1 - Line 3)			
(b) Bulk, sat.surf.dry =Line1/(Line1 - Line 3)			
(c) Apparent = Line 2/(Line2 - Line 3)			

FINE AGGREGATE

Project: مشاريع امانة جدة
Description: Filler
Sampled At: Asphalt plant Date sampled:

Description	1	2	Average
7. Weight of saturated surface dry sample (gm)			
8. Weight of Oven dry sample (gm)	200.0	200.0	
9. Weight of bottle filled with water (gm)	675.6	675.6	
10. Wt. Of bottle with sat.surf.dry sample & water (gm)	804.6	804.3	
11. Absorption = (Line 7 - Line 8)			
12. % Absorption = Line 11/Line8 * 100			
13. Specific Gravity:			
(a) Bulk, Oven-dry =Line 8 / (Line 7+Line 9-Line 10)			
(b) Bulk, sat.surf.dry =Line7 / (Line 7+Line 9 - Line 10)			
(c) Apparent = Line 8 / (Line 8 + line 9 - Line 10)	2.817	2.805	2.811

M.E Contractor



Project: _____

Description: Samples Form Hot Bin

Sampled At: Asphal Plant

THIN AND ELONGATED PARTICLES

AASHTO M-80 , ASTM C-125

COARSE AGGREGATE

SIEVE SIZES	1" - 3/4"	3/4" - 3/8"	3/8" - # 4	Total
Total Wt. of Sample, gm.		3242.1	2426.3	5668.4
Wt.of Thin and Elongated particles, gm		100.5	125.4	310.9
% Thin and Elongated particles		3.1	5.2	8.3
Original Grading % Retained		21.5	22.1	59.9
Weighted % Thin and Elongated particles		0.7	1.1	2.5
Thin and Elongated particles, adjusted for 100 %	4.1			

Remarks: _____ **Specified %max. 10**

M.E Contractor



الموضوع: بشأن طلب تحديث الخطة الاسفلتية

المحترمين

السادة / شركة دار الرياض للاستشارات الهندسية

السلام عليكم ورحمة الله وبركاته،،،

إشارة إلى الطلب المقدم من شركة انجاز الطرق للمقاولات المحدودة المقيد لدى الأمانة بالرقم ٤٦٠٠٠١٧٠٩٤ وتاريخ ١٤٤٦/٠٢/١٠ هـ بخصوص تحديث الخطة الأسفلت السطحية بنظام السوبر بيف (BWC SP).

عليه نحيل لكم المعاملة للدراسة وإجراء الاختبارات اللازمة واعتماد تحديث الخطة الاسفلتية المذكورة أعلاه والإفادة.

والسلام عليكم ورحمة الله وبركاته

→

مدير عام التشغيل والصيانة

١٤٤٦/٠٢/٢٩ هـ

م. يوسف بن ظافر الأسمرى

٢٠٢٤ / ١ / ٣٥٧٠

٢٠٢٤ / ٠٨ / ١٣ م

الموضوع / بخصوص تحديث اعتماد الخلطة الاسفلتية (BWC SP)

الموكر
المحترمون

سعادة / مدير عام التشغيل والصيانة
صورة مع التحية لاستشاري الأمانة شركة دار الرياض

تحية طيبة ،،،

بالإشارة الى الموضوع أعلاه والى مشاريعنا مع مقام امانة محافظة جدة الخاصة بالأعمال الأسفلتية بخصوص تحديث اعتماد الخلطة الاسفلتية السطحية بنظام السوبرريف (BWC SP) للمشاريع الآتية: -

رقم	رقم العقد	اسم العقد
١	001/0006/38/00/3	صيانة الشوارع جنوب محافظة جدة - بلدية الجامعة الفرعية
2	19/005/001/0006/42/00/3	صيانة الشوارع شرق محافظة جدة - بلدية ابرق الرغامة
3	001/0006/38/00/3	الصيانة والسفلتة الوقائية لشوارع شمال محافظة جدة بلدية ثول - بلدية ذهبان
4	001/0006/38/00/3	الصيانة والسفلتة الوقائية لشوارع شمال محافظة جدة بلدية طيبة - بلدية بريمان
5	001/0006/38/00/3	صيانة الشوارع جنوب محافظة جدة بلدية البلد وبلدية جدة التاريخية
6	3/00/31/0006/001/005/19	صيانة وتحسين طريق مكة القديم والأحياء المجاورة

عليه نأمل من سعادتكم التوجيه لمن يلزم بمراجعة الملفات المرفقة واعتماد تحديث الخلطة الاسفلتية السطحية بنظام السوبرريف (BWC SP).

وتقبلوا بركاتنا
مدير المشاريع
م / محمد الكهري



المملكة العربية السعودية
وزارة الشؤون البلدية والقروية



*Kingdom Of Saudi Arabia
Ministry of Municipal & Rural Affairs*

Contractor :- Road Accomplishment CO.

Superpave Mix Design
Bitumenous Wearing Coarse

شركة إنجاز الطرق للمقاولات



Superpave Mix Design Report

Page 1 of 13

Mix Design Reference No.	12.5R2C4y	Date	10/2/2019
Project Information and Basic Design Parameters			
Project	مشاريع الشركة مع أمانة محافظة جدة		
Contractor	شركة انجاز الطرق للمقاولات المحدودة		
Consultant	لويس برجر		
Project Location	Jeddah		
Mix Type	Bituminous Wearing Course		
Type of Facility	Highways		
Layer Thickness, mm	50.0	Nominal Maximum Size, mm	12.5
Thickness of the pavement above the layer, mm	0.0	Position of the layer for the design purposes (Either ≤ 100 mm or > 100 mm)	< 100
Design Traffic Class Designation (or ESALs)	Heavy (10-30 million ESAL's)	New Design	Yes
Submitted By		Approved By	
Name	Hosam Ramadan		
Designation	Material Engineer		
Date			
Signature			



Hot-Mix Asphalt Criteria

Summary of the Basic Design Parameters of the Mix Design

Project	مشاريع الشركة مع امانة محافظة جدة		
Design Traffic Class Designation (or ESALs)			Heavy (10-30 million ESAL)
Position of the layer for the design purposes (Either <100 mm or > 100 mm)			< 100
Nominal Maximum Size, mm			12.5

Summary of the Design Parameters for the HMA as Required by SUPERPAVE Mix Design System

Item	Property		Requirement	Level
SUPERPAVE Criteria for the Aggregate Consensus Properties	Coarse Aggregate Angularity, %	One Fractured Face	95.0	Min
		Two or More Fractured Faces	90.0	Min
	Fine Aggregate Angularity, %		45.0	Min
	Flat & Elongated Particle, %		10.0	Max
	Sand Equivalent, %		45.0	Min
SUPERPAVE Gyratory Compactive Effort (SGCE)	No. of Gyration	N _{initial}	8	n/a
		N _{design}	100	n/a
		N _{max}	160	n/a
SUPERPAVE Criteria for the Volumetric Mixture Design	Required Density, % G _{mm}	N _{initial}	89.0	Max
		N _{design}	96.0	n/a
		N _{max}	98.0	Max
	Voids in the Mineral Aggregate, % (VMA)		14.0	Min
			16.0	Max
	Voids Filled with Asphalt, % (VFA)		65.0	Min
			75.0	Max
	Dust to Binder Ratio (DP)		0.90	Min
			1.60	Max
	Dry Indirect Tensile Strength, kPa		Report	Min
			1400.0	Max
	Retained Indirect Tensile Strength for the Wet Set Compared to the Dry Set, %		80%	Min
Required Binder PG for the Project Based on Environmental Considerations Only		High Temperature	70	Min
		Low Temperature	-10	Min

Asphalt Binder Data

Binder Grade Selection

Selected Asphalt Binder PG From Temperature Zoning Map of the Kingdom of Saudi Arabia		PG 70-10
PG Adjustment for Traffic Level and Speed	Click here to view the grade adjustment table	1
Final Recommended ABPG for the Project	High Temperature	76
	Low Temperature	-10

Polymer Modification Requirements

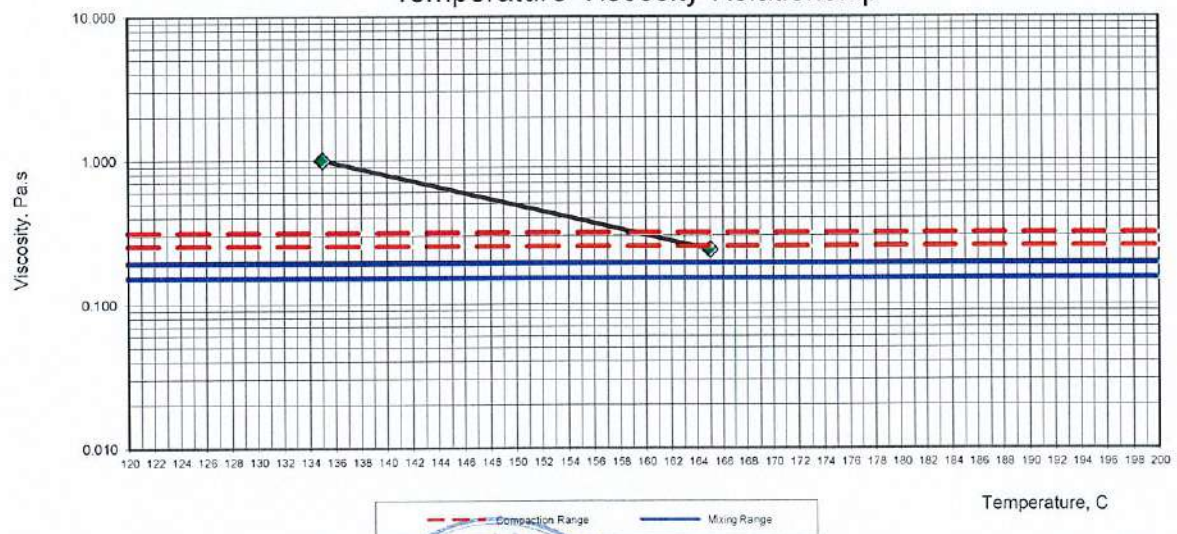
Asphalt Binder Source	60/70 Pen Grade Asphalt + 8% Crumb Rubber		
ABPG from Source	High Temperature	76	Low Temperature
			-10

If the Color code of the High or Low temperature binder PG from source is RED, then modification is needed

Binder Test Results

Binder Description		PG 76-10		
Test		Test Method	Test Result	SUPERPAVE Criteria
Flash Point, C		AASHTO T 48	320+	230 C minimum
Specific Gravity, G_b		AASHTO T 228	1.026	n/a
Rotational Viscosity @	135	AASHTO T 316	1.000	3.0 Pa.s maximum
Rotational Viscosity @	165	AASHTO T 316	0.237	n/a
Select the Mixing and Compaction Temperature From the Temperature-Viscosity Relationship		Mixing temp., C	169 - 174	n/a
		Compaction temp, C	159 - 164	n/a

Temperature-Viscosity Relationship



Aggregate Data

Summary of the Physical Properties of the Individual Aggregates

Property	Test Method	Aggregate (samples from the hot bins)				
		Agg. # 1	Agg. # 2	Agg. # 3	Agg. # 4	Agg. # 5 (Mineral Filler)
Bulk Specific Gravity, G_{sb}	AASHTO T85 and T84	2.840	2.773	2.721	2.811	2.721
Apparent Specific Gravity, G_{sa}		2.898	2.880	2.860	2.811	2.860
Water Absorption, P_{bw} %	AASHTO T85 and T84	0.703	1.337	1.784	0.000	
Coarse Aggregate Angularity, % min.	AASHTO TP61 (ASTM D 5821)	1+ Faces	98.30	98.30		
		2+ Faces	97.00	97.00		
Fine Aggregate Angularity, % min.	AASHTO T 304			48.70	48.70	48.70
Flat & Elongated Particles, % max	ASTM D 4791	4.70	4.70			
Sand Equivalent, % min	AASHTO T 176			57.00	57.00	57.00
Soundness	AASHTO T104	4.24/4.85				
Deleterious Materials	AASHTO T112	0.12				
Toughness (LA Abrasion)	AASHTO T95	26.20				

Summary of the Aggregate Gradations

Sieve Size		Percentage Passing				
		Samples From the Hot Bins				
mm	in	Agg. # 1	Agg. # 2	Agg. # 3	Agg. # 4	Agg. # 5
50.0	2.0	100.0	100.0	100.0	100.00	
37.5	1.5	100.0	100.0	100.0	100.00	
25.0	1.0	100.0	100.0	100.0	100.00	
19.0	3/4	100.0	100.0	100.0	100.00	
12.5	1/2	78.1	100.0	100.0	100.00	
9.5	3/8	41.2	80.0	100.0	100.00	
4.75	No.4	13.2	28.6	98.4	100.00	
2.36	No 8	4.2	17.2	67.5	100.00	
1.18	No 16	2.1	11.3	48.3	100.00	
0.60	No 30	1.8	5.0	36.4	100.00	
0.30	No 50	1.6	3.7	22.2	99.20	
0.15	No 100	1.1	1.8	14.0	93.10	
0.075	No. 200	0.8	0.6	5.1	84.00	

Selection of DAS

Aggregate Gradation

Sieve Size raised to 0.45 power	Sieve Size		Percentage Passing				
			Samples From the Hot Bins				
	mm	in	Agg. # 1	Agg. # 2	Agg. # 3	Agg. # 4	Agg. # 5
5.81	50.0	2	100.0	100.0	100.0	100.0	0.0
5.11	37.5	1.5	100.0	100.0	100.0	100.0	0.0
4.26	25	1	100.0	100.0	100.0	100.0	0.0
3.76	19.0	3/4	100.0	100.0	100.0	100.0	0.0
3.12	12.5	1/2	78.1	100.0	100.0	100.0	0.0
2.75	9.5	3/8	41.2	80.0	100.0	100.0	0.0
2.02	4.75	No.4	13.2	28.6	98.4	100.0	0.0
1.47	2.36	No 8	4.2	17.2	67.5	100.0	0.0
1.08	1.18	No 16	2.1	11.3	48.3	100.0	0.0
0.79	0.60	No 30	1.8	5.0	36.4	100.0	0.0
0.58	0.30	No 50	1.6	3.7	22.2	99.2	0.0
0.43	0.15	No 100	1.1	1.8	14.0	93.1	0.0
0.31	0.075	No. 200	0.8	0.6	5.1	84.0	0.0

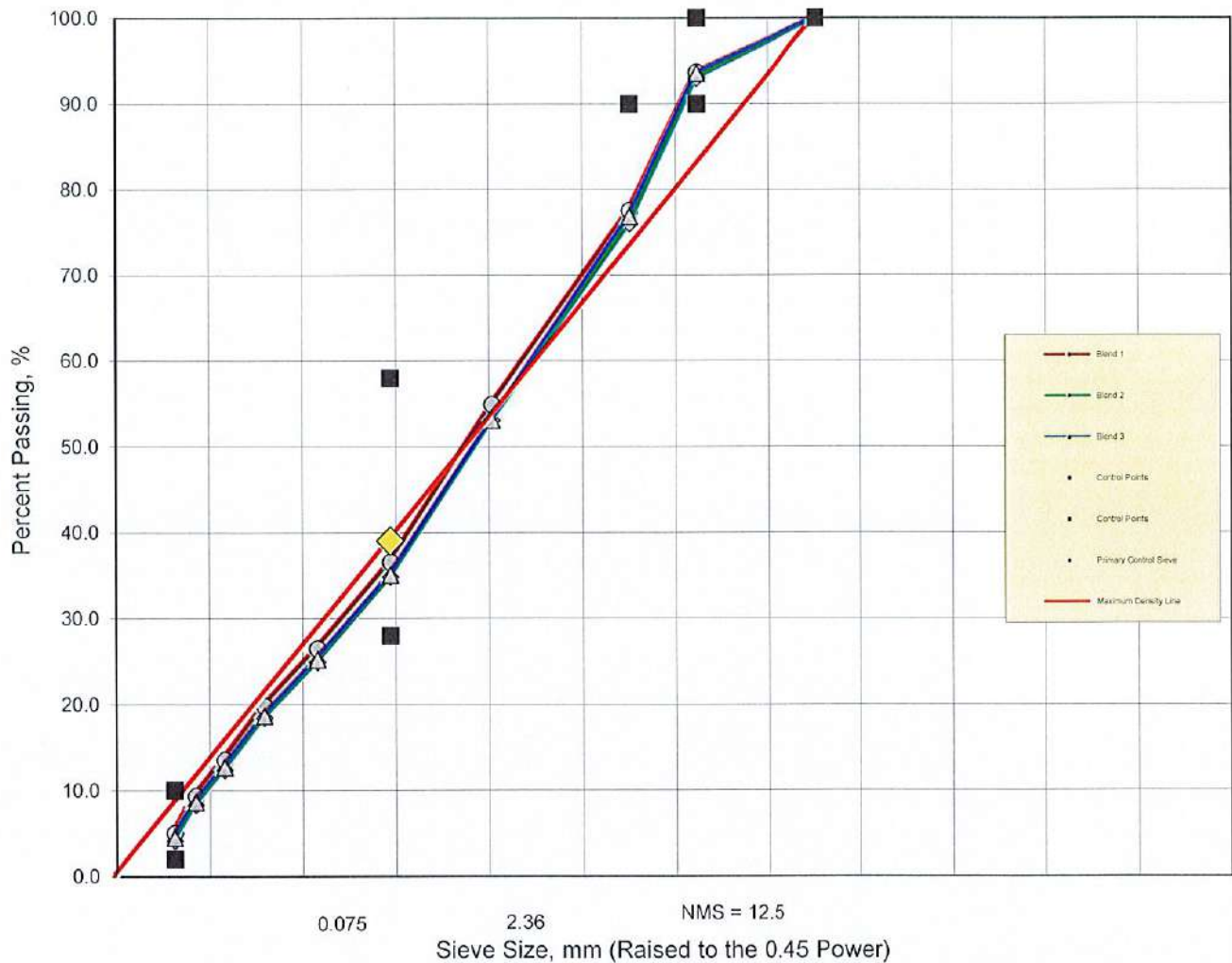
Suggested Blending Percentages

Blend #	Total	Agg. # 1	Agg. # 2	Agg. # 3	Agg. # 4	Agg. # 5
Blend 1	100.0	29.0	27.0	41.0	3.0	
Blend 2	100.0	32.0	26.0	40.0	2.0	
Blend 3	100.0	29.5	29.0	39.0	2.5	

Selection of DAS

Sieve Size raised to 0.45 power	Sieve Size in mm	SUPERPAVE Criteria, % Passing			% Passing			
		Control Points		The Primary Control Sieve	Blend 1	Blend 2	Blend 3	Remarks
		Min	Max					
5.81	50.0			The PCS was introduced in the new AASHTO M323 "Superpave Volumetric Mix Design Specifications", 2005	100.0	100.0	100.0	
5.11	37.5				100.0	100.0	100.0	
4.26	25.0				100.0	100.0	100.0	
3.76	19.0	100.0		It is defined as the sieve size that classifies the gradation between course and fine. PCS is specified for each NMS.	100.0	100.0	100.0	100.0
3.12	12.5	90.0	100.0		93.6	93.0	93.5	94.0
2.75	9.5		90.0		77.5	76.0	76.9	78.5
2.02	4.75				54.9	53.0	53.1	56.4
1.47	2.36	28.0	58.0		36.5	34.8	35.1	38.8
1.08	1.18				26.5	24.9	25.2	29.8
0.79	0.60			For 12.5 mm NMS the PCS is 2.36 mm and the % passing at this sieve is 39.0% If the gradation line passes above the PCS then the gradation is classified as fine otherwise it is classified as coarse.	19.8	18.4	18.7	22.0
0.58	0.30				13.5	12.3	12.7	14.3
0.43	0.15				9.3	8.3	8.6	9.4
0.31	0.075	2.0	10.0		5.0	4.1	4.5	4.9
Based on the PCS Criteria, the gradation of each blend is classified as					Coarse	Coarse	Coarse	

Gradation Curve for the Suggested Blends Compared to SUPERPAVE Gradation Criteria - 12.5 mm Nominal Maximum Size



Verification of the Design NMS for the Proposed Blends

Sieve Size	Blend 1	Blend 2	Blend 3	Remarks
37.5				
25.0				
19.0				
12.5	NMS	NMS	NMS	
9.5				



Estimated Combined Properties of the Blends and Comparison with Superpave Criteria

Property	SUPERPAVE Criteria		Blend 1	Blend 2	Blend 3	Remarks
Bulk Specific Gravity	G_{sb}	n/a	2.771	2.773	2.773	
Apparent Specific Gravity	G_{sa}	n/a	2.875	2.876	2.876	
Water Absorption, %	Pbw	n/a	1.296	1.286	1.291	
Coarse Aggregate Angularity, % min.	1 + Faces	95	98.3	98.3	98.3	
	Meet the Criteria ?		Yes	Yes	Yes	
	2+ Faces	90	97.0	97.0	97.0	
	Meet the Criteria ?		Yes	Yes	Yes	
Fine Aggregate Angularity, % min.	FAA	45	49.0	49.0	49.0	
	Meet the Criteria ?		Yes	Yes	Yes	
Flat & Elongated, % max	F&E	10	4.7	4.7	4.7	
	Meet the Criteria ?		Yes	Yes	Yes	
Sand Equivalent, % min	SE	45	57.0	57.0	57.0	
	Meet the Criteria ?		Yes	Yes	Yes	

Estimation of the Initial Trial Asphalt Binder % (P_{bi}) for the Trial Blends

Computed Value of		Blend 1	Blend 2	Blend 3	Remarks
Absorption Constant		0.8	0.8	0.8	
Aggregate Effective Specific Gravity, G_{se}		2.854	2.856	2.855	
Aggregate Bulk Specific Gravity, G_{sb}		2.771	2.773	2.773	
Volume of the Absorbed Binder, V_{ba}		0.0250	0.0248	0.0249	
Volume of Effective Binder, V_{be}		0.1020	0.1020	0.1020	
Percent of the initial trial asphalt binder, P_{bi}	Calculated P_{bi} Value Based on AASHTO R-35 and SP-2	5.2	5.2	5.2	
	Input the selected P_{bi} Value either from the calculation or from experience	5.0	5.0	5.0	



Summary of the Densification Data for the Trial Blends

	Blend 1		Blend 2		Blend 3	
Percent of the initial trial asphalt binder, P_{bi}	5		5		5	
Property	Sample No.					
	1	2	1	2	1	2
Height of samples at N_{ini}	128.5	129.6	128.5	129.6	129.5	129.3
Average Height of samples at N_{ini}	129.1		129.1		129.4	
Height of samples at N_{des}	115.2	115.1	114.3	114.6	115.0	114.9
Average Height of samples at N_{des}	115.2		114.5		115.0	
Weight of Sample (Oven Dry), g	4825.3	4824.7	4823.9	4826.5	4825.0	4824.2
Weight of Sample (Saturated Surface Dry), g	4843.2	4844.2	4842.9	4846.2	4844.1	4844.2
Weight of Sample in Water, g	2899.3	2896.3	2892.3	2890.0	2880.6	2887.5
Bulk Specific Gravity (G_{mb}) @ N_{des}	2.482	2.477	2.473	2.467	2.457	2.465
Average Bulk Specific Gravity (G_{mb}) @ N_{des}	2.480		2.470		2.461	
Wight of the Loose Mix, g	2201.3	2203.1	2201.5	2200.8	2201.7	2202.0
Weight of Flask With Water, g	9651.5	9651.5	9651.5	9651.5	9651.5	9651.5
Weight of Flask with Water and Loose Mix, g	10999.0	11001.2	10995.5	10996.3	10992.5	10993.3
Maximum Specific Gravity (G_{mm})	2.578	2.582	2.567	2.571	2.558	2.560
Average Maximum Specific Gravity (G_{mm})	2.580		2.569		2.559	

Determination of Volumetric Properties of the Trial Blends

Computed Value	Blend 1	Blend 2	Blend 3
% G_{mm} @ N_{ini}	85.8	85.3	85.4
% G_{mm} @ N_{des}	96.1	96.1	96.2
% Air Voids	3.9	3.9	3.8
% VMA_{ini}	15.0	15.4	15.7
Percent of the initial trial asphalt binder, P_{bi}	5.0	5.0	5.0
Calculated G_{se} from G_{mm}	2.803	2.790	2.777
% Asphalt Absorption, P_{ba}	0.422	0.220	0.064

Determination of Volumetric Properties for the Trial Blends at 4.0% Air Voids

Estimated Values	Blend 1	Blend 2	Blend 3
Estimated asphalt @ 4.0% air voids ($P_{b_{estimated}}$)	5.0	4.9	4.9
% G_{mm} @ N_{ini}	85.6	85.1	85.3
% G_{mm} @ N_{des}	96.0	96.0	96.0
% Air Voids	4.0	4.0	4.0
Voidage Constant (C)	0.1	0.1	0.1
% $VMA_{estimated}$	15.0	15.4	15.7
% $VFA_{estimated}$	73.36	74.03	74.49
Effective asphalt binder content (P_{be})	4.6	4.7	4.9
Dust Proportion (DP ratio)	1.10	0.87	0.92

Comparison of Volumetric Properties of the Trial Blends with Criteria

Computed Value	Blend 1	Blend 2	Blend 3
% G_{mm} @ N_{ini}	OK	OK	OK
% G_{mm} @ N_{des}	OK	OK	OK
% Air Voids	OK	OK	OK
% $VMA_{estimated}$	OK	OK	OK
% $VFA_{estimated}$	OK	OK	OK
Dust Proportion (DP ratio)	OK	Not OK	OK



Selection of the Design Asphalt Content (DAC)

The Selected Blend from the DAS Step is	Blend 1
Input the Following Properties of the Selected Blend	
Bulk Specific Gravity of the Selected Blend, G_{sb}	2.771
Estimated asphalt to achieve 4.0% air voids ($P_{b,estimated}$)	5.0
Percentage Passing 0.075 Sieve (N0 200) of the Selected Blend	5.0

Densification Data for the DAC

DAC Suggested Levels	4.5		5.0		5.5		6.0	
Property	Sample No.							
	1	2	1	2	1	2	1	2
Height of samples at N_{mi}	129.4	129.3	128.3	128.0	126.8	126.9	126.3	125.4
Average Height of samples at N_{mi}	129.4		128.2		126.9		125.9	
Height of samples at N_{des}	115.2	114.9	114.3	114.4	113.8	113.7	113.3	112.7
Average Height of samples at N_{des}	115.1		114.4		113.8		113.0	
Determination of G_{mb} @ N_{des}								
Weight of Sample (Oven Dry), g	4823.6	4827.4	4826.6	4822.7	4830.0	4824.7	4827.6	4831.6
Weight of Sample (Saturated Surface Dry), g	4842.6	4845.8	4839.5	4835.2	4840.1	4833.1	4831.7	4836.8
Weight of Sample in Water, g	2882.8	2880.1	2892.7	2892.3	2901.2	2899.0	2877.0	2882.1
Bulk Specific Gravity (G_{mb}) @ N_{des}	2.461	2.456	2.479	2.482	2.491	2.495	2.470	2.472
Average Bulk Specific Gravity (G_{mb}) @ N_{des}	2.459		2.480		2.493		2.471	
Determination of G_{mm}								
Wight of the Loose Mix, g	2231.6	2214.6	2228.4	2233.6	2215.7	2241.7	2244.1	2234.0
Weight of Flask With Water, g	7546.3	7546.3	7546.3	7546.3	7546.3	7546.3	7546.3	7546.3
Weight of Flask with Water and Loose Mix, g	8917.5	8905.8	8911.3	8915.5	8899.5	8913.3	8910.1	8905.2
Maximum Specific Gravity (G_{mm})	2.594	2.590	2.581	2.584	2.569	2.563	2.549	2.553
Average Maximum Specific Gravity (G_{mm})	2.592		2.582		2.566		2.551	



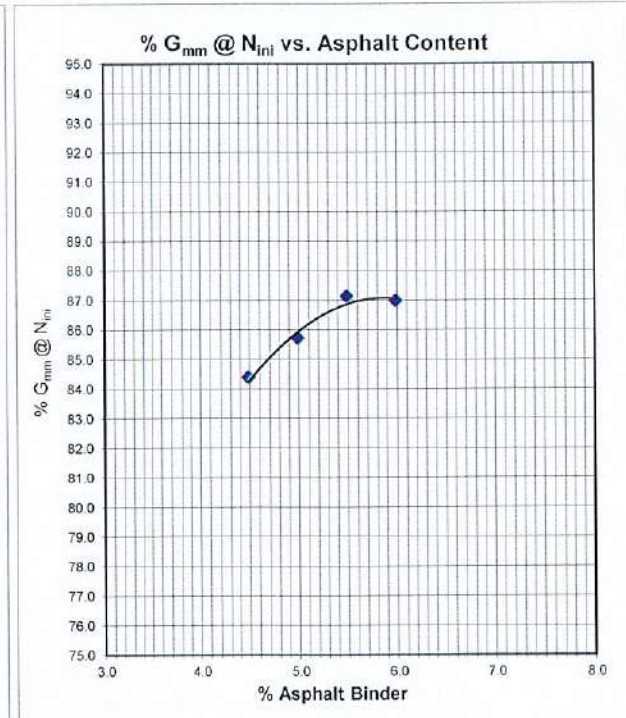
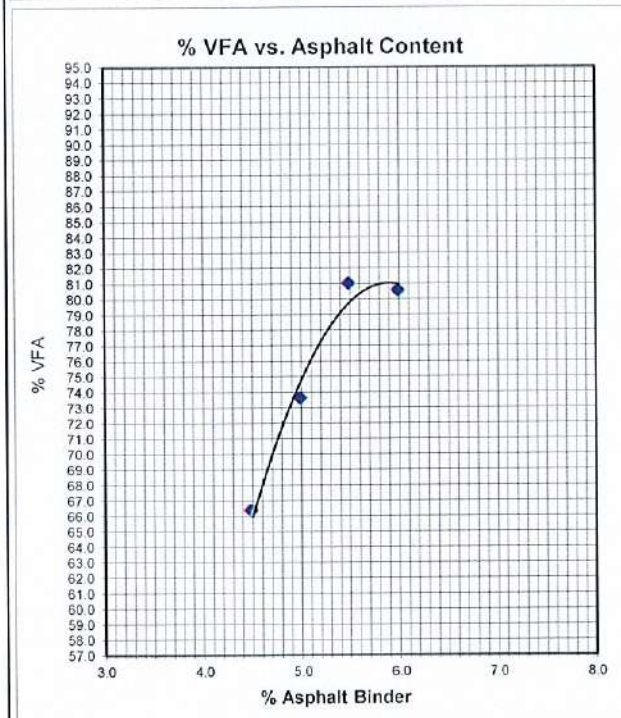
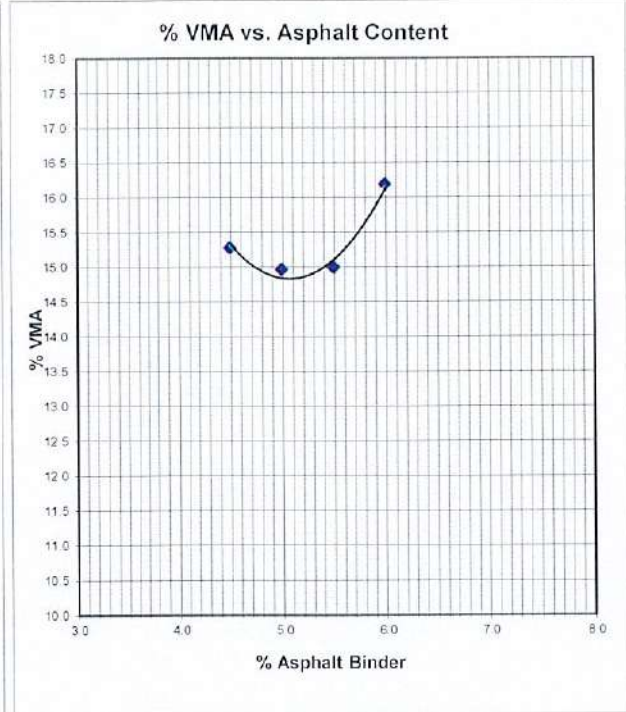
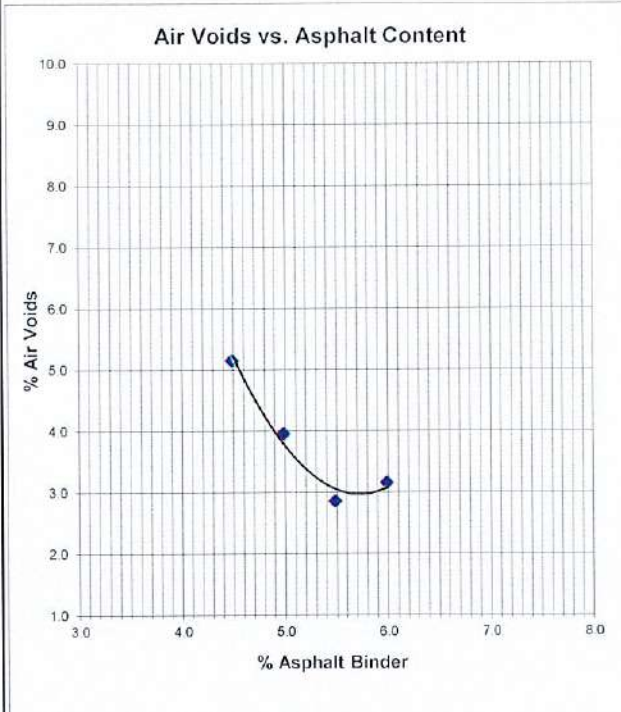
Determination of Volumetric Properties for the DAC

Computed Value	4.5	5.0	5.5	6.0
% G_{mm} @ N_{ini}	84.4	85.7	87.1	87.0
% G_{mm} @ N_{des}	94.9	96.1	97.2	96.9
% Air Voids	5.1	3.9	2.8	3.1
% VMA	15.3	15.0	15.0	16.2
% VFA	66.3	73.6	81.0	80.6
Calculated G_{se} from G_{mm}	2.793	2.807	2.811	2.818
% Asphalt Absorption, P_{ba}	0.29	0.47	0.53	0.62
Effective asphalt binder content (P_{be})	4.2	4.6	5.0	5.4
Dust Proportion (DP ratio)	1.18	1.10	1.00	0.92

Determination of the DAC and Verification of Volumetric Requirements of the Mix Compared to Superpave Criteria

Property		Value	Meet the Criteria ?	SUPERPAVE Criteria
DAC (Selected % Asphalt Binder Content at 4.0 air voids)		4.9	n/a	n/a
Calculated G_{se} from G_{mm}		2.807	n/a	n/a
Effective asphalt binder content (P_{be}), %		4.5	n/a	n/a
% G_{mm} @ N_{ini}		85.9	Yes	89
% G_{mm} @ N_{des}		96.0	Yes	96
% Air Voids		4.0	Yes	4
% VMA		14.7	Yes	14 16
% VFA	Minimum	74.5	Yes	65
	Maximum			75
Dust Proportion (DP ratio)	Minimum	1.122	Yes	0.9
	Maximum			1.6





Mix Design Curves To Select the Design Asphalt Content (DAC)



Mix Design Verification

(1) Verification of the HMA Volumetric Properties at N_{des}

Property	Sample #		
	1	2	
Height of samples at N_{ini}	127.3	127.9	
Average Height of samples at N_{ini}	127.6		
Height of samples at N_{des}	114.4	115.4	
Average Height of samples at N_{des}	114.9		
Determination of G_{mb} @ N_{des}			
Weight of Sample (Oven Dry), g	4826.3	4825.8	
Weight of Sample (Saturated Surface Dry), g	4843.7	4842.8	
Weight of Sample in Water, g	2901.2	2897.4	
Bulk Specific Gravity (G_{mb}) at N_{des}	2.485	2.481	
Average Bulk Specific Gravity (G_{mb}) at N_{des}	2.483		
Determination of G_{mm}			
Wight of the Loose Mix, g	2212.3	2235.3	
Weight of Flask With Water, g	9651.5	9651.5	
Weight of Flask with Water and Loose Mix, g	11006.3	11022.2	
Maximum Specific Gravity (G_{mm})	2.580	2.585	
Average Maximum Specific Gravity (G_{mm})	2.583		
Property	Value	meet the Criteria ?	Superpave Criteria
Design Asphalt Content, %	4.9	n/a	n/a
Bulk Specific Gravity, G_{sb}	2.771	n/a	n/a
Effective Specific Gravity, G_{se}	2.802	n/a	n/a
% G_{mm} @ N_{ini}	86.6	Yes	89.0
% G_{mm} @ N_{des}	96.1	Yes	96.0
% Air Voids	3.9	Yes	4.0
% VMA	14.8	Yes	14.0 16.0
% VFA	73.8	Yes	65.0 75.0
Asphalt Absorption, (P_{ba})	0.405	n/a	n/a
% Passing 0.075 mm Sieve	5.00	n/a	n/a
Effective asphalt binder content (P_{be})	4.5	n/a	n/a
Dust Proportion (DP ratio)	1.11	Yes	0.90 1.60

(2) Verification of the HMA Volumetric Properties at N_{max}

Property		Sample #		
		1	2	
Determination of G_{mb} @ N_{max}				
Weight of Sample (Oven Dry), g		4826.9	4831.4	
Weight of Sample (Saturated Surface Dry), g		4832.8	4837.2	
Weight of Sample in Water, g		2905.0	2904.5	
Bulk Specific Gravity (G_{mb}) at N_{max}		2.504	2.500	
Average Bulk Specific Gravity (G_{mb}) at N_{max}		2.502		
Property	Average	% G_{mm} @ N_{max}	Meet the Criteria ?	Superpave Criteria, Max.
Bulk Specific Gravity, G_{mb} @ N_{max}	2.502	96.9	Yes	98.0
Maximum Specific Gravity, G_{mm}	2.583			



Evaluation of Strength and Moisture Sensitivity AASHTO T283

Note: The evaluation of the moisture sensitivity of the designed Hot-Mix Asphalt is performed according to SUPERPAVE Mix Design Guidelines Approved and Issued by the Ministry of Transport.

Required SGCE (No of Gyration) to Achieve 7.0 Air Voids (%Gmm = 93.0%) =

49

Original Samples

Property	Sample					
	Dry Set (control)			Wet-Set (Conditioned)		
	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
Diameter, mm	150.00	150.00	150.00	150.00	150.00	150.00
Thickness, mm	93.4	93.0	94.2	94.6	92.8	93.3
Weight of Dry Sample in Air, g	3850.1	3849.6	3848.7	3850.3	3851.5	3853.0
Weight of SSD Sample in Air, g	3880.4	3879.2	3880.9	3879.0	3881.0	3884.5
Weight of Sample in Water, g	2270.3	2272.5	2275.6	2278.0	2280.1	2285.5
Volume	1610.1	1606.7	1605.3	1601.0	1600.9	1599.0
Bulk Specific Gravity	2.391	2.396	2.397	2.405	2.406	2.410
Maximum Specific Gravity (G_{mm})	2.583	2.583	2.583	2.583	2.583	2.583
% Air Voids	7.4	7.2	7.2	6.9	6.9	6.7
Maximum load, Newton	14754.0	14770.0	17699.0	Remarks:		
DRY Tensile Strength, kPa	670	674	797			
Average DRY Tensile Strength, kPa	714					

Conditioned 24 Hours in 60 °C Water

Thickness, mm	94.6	92.8	93.3
Maximum Load, Newton	13958.0	13854.0	13759.0
Wet Tensile Strength, kPa	626	634	626

Computation and Comparison with SUPERPAVE Criteria

Property	ITS	Tensile Strength Ratio (TSR)	Meet the Criteria ?	SUPERPAVE Criteria, % Max.
Tensile Strength of the Dry set, kPa	714	88.0%	Yes	80.0%
Tensile Strength of the Wet set, kPa	629			



Consultant Mouchel		
Project :	مشاريع امانة جدة	
Dascreption	Bituminous Wearing Course	Plant Traial
Sampled At	Raco Asphalt Plant	Sample Date
1) Bituminous Content		
TEST NO.	1	
(a) WEIGHT OF SAMPLE BEFOR TEST	2136.2	
(b) WEIGHT OF SAMPLE AFTER TEST	2023.4	
(c) WT.OF FILTER PAPER BEFORE TEST	22.1	
(d) WT.OF FILTER PAPER AFTER TEST	24.5	
(e) INCREASE IN WT. OF FILTER PAPER (d - c)	2.4	
(f) TOTAL WEIGHT OF AGGREGATE (b + e)	2025.8	
(g) WEIGHT OF BITUMINOUS MATERIAL (a - f)	110.4	
(h) ASPHALT CONTENT (g / a) * 100	5.17	
AVERAGE ASPHALT CONTENT =	5.17%	

2) Sieve Analysis

SIEVE SIZE	WT. RETAINED	CUM.WT. RETAINED	CUM.WT. PASSING	PERCENT PASSING	J M F	CONTROL POINTS
2"						
1 1/2"						
1"						
3/4"	0.0	0.0	2025.8	100.0%	100	100
1/2"	100.4	100.4	1925.4	95.0%	90--98	90-100
3/8"	301.8	402.2	1623.6	80.1%	74--82	90 MAX
NO.4	477.7	879.9	1145.9	56.6%	50-60	
NO.8	322.5	1202.4	823.4	40.6%	32-42	28-58(pcs=39)
NO.16	238.4	1440.8	585.0	28.9%	23-31	
NO.30	161.2	1602.0	423.8	20.9%	16-24	
NO.50	91.2	1693.2	332.6	16.4%	10-18	
NO.100	148.9	1842.1	183.7	9.1%	7-11	
NO.200	81.2	1923.3	102.5	5.06%	3.5-6.5	2-10
PAN	4.7					
WASH	97.8					
TOTAL	2025.8					

TOTAL WEIGHT OF AGGREGATE
WASH OVEN DRY WEIGHT

2025.8
1928.0



Project : مشاريع امارة جدة	Plant Trial	
Description : Bituminous Wearing Course	Sample Date:	
Sampled At: Raco Asphalt Plant		
BITUMINOUS Wearing COUESE SUPERPAVE		
Property	Sample #	
	1	2
Height of samples at N_{ini}	124.3	126.3
Average Height of samples at N_{ini}	125.3	
Height of samples at N_{des}	112.6	114.0
Average Height of samples at N_{des}	113.3	
Determination of G_{mb} @ N_{des}		
Weight of Sample (Oven Dry), g	4828.3	4832.5
Weight of Sample (Saturated Surface Dry), g	4842.3	4846.9
Weight of Sample in Water, g	2897.8	2900.0
Bulk Specific Gravity (G_{mb}) at N_{des}	2.483	2.482
Average Bulk Specific Gravity (G_{mb}) at N_{des}	2.483	
Determination of G_{mm}		
Wight of the Loose Mix, g	2185.3	2178.9
Weight of Flask With Water, g	9652.1	9652.1
Weight of Flask with Water and Loose Mix, g	10992.3	10986.6
Maximum Specific Gravity (G_{mm})	2.586	2.580
Average Maximum Specific Gravity (G_{mm})	2.583	
	Value	meet the Criteria ?
Asphalt Content, %	5.17	n/a
bitumen spesific gravity , G_b	1.026	n/a
Bulk Specific Gravity, G_{sb}	2.771	n/a
Effective Specific Gravity, G_{se}	2.816	n/a
% G_{mm} @ N_{ini} $(G_{mb}/G_{mm}) * H_{des}/H_{ini}$	86.9	Yes
% G_{mm} @ N_{des} G_{mb}/G_{mm}	96.1	Yes
% Air Voids $(G_{mm}-G_{mb})/G_{mm}$	3.9	Yes
% VMA $100-(G_{mb}*P_s)/G_{sb}$	15.0	Yes
% VFA $(G_{mb}*P_{be}/G_b)*100/VMA$	74.12	Yes
Asphalt Absorption, (P_{ba}) $(G_{se}-G_{sb})/(G_{sb}*G_{se})*G_b*100$	0.59	n/a
% Passing 0.075 mm Sieve	5.06%	n/a
Effective asphalt binder content (P_{be}) $P_b-((100-P_b)*(P_{ba}/100))$	4.6%	n/a
Dust Proportion (DP ratio) %Passing # 200/(P_{be})	1.10	Yes
(2) Verification of the HMA Volumetric Properties at N_{max}		
Property	Sample #	
	1	2
Determination of G_{mb} @ N_{max}		
Weight of Sample (Oven Dry), g	4824.1	4826.9
Weight of Sample (Saturated Surface Dry), g	4830.7	4832.1
Weight of Sample in Water, g	2889.9	2888.9
Bulk Specific Gravity (G_{mb}) at N_{max}	2.486	2.484
Average Bulk Specific Gravity (G_{mb}) at N_{max}	2.485	
Property	Average	% G_{mm} @ N_{max}
Bulk Specific Gravity, G_{mb} @ N_{max}	2.485	96.2
Maximum Specific Gravity, G_{mm}	2.583	
		Meet the Criteria ?
		Superpave Criteria, MAX.
		98.0



Start Of Test : Sunday, November 03, 2019 14:07:22

Parameter File : c:\documents and settings\all users\application data\bohlin\rotational\asphalt tests\rtfo g
Description : RTFO Binder Grade

Sample Reference : none

Measuring System : PP 25 DSR

Gap Setting : 1.000 mm

Parameter Summary :

No. Test Runs : 1

Temp Mode : ISOTHERMAL 64.0 °C

Thermal Equilibrium Time : 600.00 s

Pre-Shear : OFF

Shear mode : Controlled Stress

Oscillation Mode: Grade Sample Mode : (R)TFOT

Frequency : 10.0 rad/s No. Samples : 1

Target Strain : 10.0 %

Temperature : 64.0 °C

Thermal Equilibrium Time : 600 s

Time	Temperature	Frequency	Phase Angle	Complex Modulus	Elastic Modulus	Viscous Modulus	Complex Viscosity	Shear Stress	Strain
t (s)	T (°C)	f (Hz)	δ (°)	G^* (Pa)	G' (Pa)	G'' (Pa)	η^* (Pa.s)	σ (Pa)	γ (%)
26.7760	76.02	1.5957e+00	80.28	3.3364e+03	5.6312e+02	3.2886e+03	3.3277e+02	3.3494e+02	1.005422e-01
26.8044	81.99	1.5957e+00	78.46	1.7247e+03	3.4497e+02	1.6898e+03	1.7201e+02	1.7277e+02	1.005247e-01

Final Results :

Pass Fail Temp : 80.0 °C

Grade : 76

Temperature : 76.0 °C

$G^*/\sin(\delta)$: 3.385 kPa

Result : Pass

Temperature : 82.0 °C

MALVERN INSTRUMENTS

$G^*/\sin(\delta)$: 1.7602 kPa

Result : Fail

Integrated DSR10 M : OSCILLATION

Start Of Test : Saturday, November 02, 2019 23:23:37

Parameter File : c:\documents and settings\all users\application data\bohlin\rotational\asphalt tests\ob gr

Description : Original Binder Grade

Sample Reference : none

Measuring System : PP 25 DSR

Gap Setting : 1.000 mm

Parameter Summary :

No. Test Runs : 1

Temp Mode : ISOTHERMAL 64.0 °C

Thermal Equilibrium Time : 600.00 s

Pre-Shear : OFF

Shear mode : Controlled Stress

Oscillation Mode: Grade Sample Mode : OB

Frequency : 10.0 rad/s No. Samples : 1

Target Strain : 12.0 %

Temperature : 64.0 °C

Thermal Equilibrium Time : 600 s

Time	Temperature	Frequency	Phase Angle	Complex Modulus	Elastic Modulus	Viscous Modulus	Complex Viscosity	Shear Stress	Strain
t (s)	T (°C)	f (Hz)	δ (°)	G* (Pa)	G' (Pa)	G'' (Pa)	η^* (Pa.s)	σ (Pa)	γ (%)
26.8248	76.05	1.5957e+00	81.57	1.5942e+03	2.3234e+02	1.5671e+03	1.5901e+02	1.9002e+02	1.202658e-01
26.7938	81.94	1.5957e+00	78.94	8.8151e+02	1.6905e+02	8.6515e+02	8.7919e+01	1.0546e+02	1.203791e-01

Final Results :

Pass Fail Temp : 80.8 °C

Grade : 76

Temperature : 76.1 °C

G*/sin(delta) : 1.6016 kPa

Result : Pass

Temperature : 81.9 °C

MALVERN INSTRUMENTS

$G^*/\sin(\delta)$: 0.89818 kPa

Result : Fail

Integrated DSR10 M : OSCILLATION



CLAY LUMPS AND FRIABLE PARTICLES

MRDTM - 312 , AASHTO T - 112

Project: مشاريع امانة محافظة جدة
Description: Samples Form Hot Bin
Sampled At: Asphal Plant

SIEVE SIZE		ORIGINAL GRADING %	WT. OF TEST SAMPLE	AFTER TEST SIEVE SIZE	RETAINED MASS g	PASSING MASS g	PERCENT CLAY	WEIGHTED PER. CLAY
PASSING	RETAINED	A	B	C	D	E	F	G
1"	3/4"	0.0	2500.1	No. 4	2495.3	4.8	0.19	0.0000
3/4"	3/8"	22.5	2501.3	No.4	2496.9	4.4	0.18	0.0396
3/8"	NO 4	22.6	2500.4	No.8	2495.5	4.9	0.20	0.0443
NO 4	NO 8	18.4	1500.8	No.16	1496.8	4.0	0.27	0.0490
TOTAL		63.5	TOTAL					0.1329

Clay Lumps Corrected for 100% = 0.21 Specified Loss%= 0.25 Max.

REMARKS:



M.E Contractor



Project: مشاريع امانة محافظة جدة
Description: Hot Bin Samples
Sampled at: Asphalt Plant

DETERMINATION OF PERCENTAGE OF CRUSHED AGGREGATE

CRUSHED FRACTION DETERMINATION

Passing	Retained	Test Mass (A)	Crushed Mass (B)	Percent Crushed
3/4"	3/8"	2600.4	2516.6	96.8
3/8"	#4	2251.0	2215.7	98.4

CALCULATIONS

Passing	Retained	Test Portion %	Percent Crushed	Weighted % Crushed
3/4"	3/8"	21.5	96.8	20.81
3/8"	#4	22.1	98.4	21.75
Total		43.6		42.6

Total Test Portion % (C) = 43.6
 Total Weighted % Crushed (D) = 42.6
 Weighted Average Percent Crushed Particles = $D/C \times 100 = 97.6\%$
 Specified for One Face Crushed = 95.0 % Min

M.EContractor





Project: مشاريع امانة محافظة جدة
Description: Samples Form Hot Bin
Sampled At: Asphal Plant

UNCOMPACTED VOID CONTENT OF FINE AGGREGATES

(AASHTO T 304-96)

Calibrated Volume of Cylinder:

V = 101 ml.

Specific Gravity of Aggregate:

G = 2.685

Method A: Standard Graded Sample

Ret. on Sieve	Mass (g)
No. 16	44
No. 30	57
No. 50	72
No. 100	17
	190 ± 0.2

Determination no.	1	2
Weight of Empty Cylinder(W ₁) gms.	246.9	246.9
Weight of Cylinder with Loose Aggregate(W ₂) gms.	388.2	389.8
Weight of Loose Aggregate, F=(W ₂ -W ₁) gms.	141.3	142.9
Uncompacted Void Content, U=((V-F/G)/V)100, %	47.9	47.3
Average:	47.6	ok

Remarks: Specified limit ≥ 45%.



M.E Contractor



SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # 4

Source: RACO Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Original,g 3177

Loose

Oven Dry,g 3177

Rodded

Wash Oven Dry,g 3025

M.Contaent =

Washing Loss,g 152

Fineness =

Sieve Size	Weight Retained	Cumulative Weight passing	Cumulative Percent Passing	Governing Specs.
2"	0	3177	100	
1 1/2"	0	3177	100.0	
1"	0	3177	100.0	
3/4"	0	3177	100.0	
1/2"	0	3177	100.0	
3/8"	0	3177	100.00	
#4	70	3107	97.80	
#8	985	2122	66.80	
#16	591	1531	48.20	
#30	400	1131	35.60	
#50	438	693	21.80	
#100	229	464	14.60	
#200	308	156	4.90	
Pan	4			
Wash 200	152			
Total	3177			

M.E Controctor:





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # 4

Source: RACO Asphalt PLANT

DRY UNIT WT gm/cc

Loose

Rodded

M.Contaent =

Fineness =

WEIGHT OF SAMPLE IN GRAMS

Original,g 3042

Oven Dry,g 3042

Wash Oven Dry,g 2883

Washing Loss,g 159

Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
					100	
2"	0	3042				
1 1/2"	0	3042			100.0	
1"	0	3042			100.0	
3/4"	0	3042			100.0	
1/2"	0	3042			100.0	
3/8"	0	3042			100.00	
#4	27	3015			99.10	
#8	958	2056			67.60	
#16	566	1491			49.00	
#30	380	1110			36.50	
#50	435	675			22.20	
#100	265	411			13.50	
#200	249	161			5.30	
Pan	2					
Wash 200	159					
Total	3042					

M.E Controctor:

[Signature]





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # 4

Source: RACO Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Original,g 3162

Loose

Oven Dry,g 3162

Rodded

Wash Oven Dry,g 3004

M.Contaent =

Washing Loss,g 158

Fineness =

Sieve Size	Weight Retained	Cumulative Weight passing	Cumulative Percent Passing	Governing Specs.
2"	0	3162	100	
1 1/2"	0	3162	100.0	
1"	0	3162	100.00	
3/4"	0	3162	100.00	
1/2"	0	3162	100.00	
3/8"	0	3162	100.00	
#4	54	3108	98.30	
#8	955	2153	68.10	
#16	642	1511	47.80	
#30	338	1173	37.10	
#50	458	715	22.60	
#100	275	440	13.90	
#200	278	161	5.10	
Pan	3			
Wash 200	158			
Total	3162			

M.E Controctor:

[Signature]





SIEVE ANALYSIS

Sample Description : Bin # 4

Source: RACO Asphalt PLANT

Sieve Size	Cumulative Percent Passing	Cumulative Percent Passing	Cumulative Percent Passing	AVG Percent Passing	Governing Specs.
2"					
1 1/2"					
1"					
3/4"	100.0	100.0	100.0	100.0	
1/2"	100.0	100.0	100.0	100.0	
3/8"	100.0	100.0	100.0	100.0	
#4	97.8	99.1	98.3	98.4	
#8	66.8	67.6	68.1	67.5	
#16	48.2	49.0	47.8	48.3	
#30	35.6	36.5	37.1	36.4	
#50	21.8	22.2	22.6	22.2	
#100	14.6	13.5	13.9	14.0	
#200	4.9	5.3	5.1	5.1	
Pan					
Wash 200					
Total					

M.E Controctor:





SIEVE ANALYSIS						
(AASHTO T-27/ASTM C-136)						
Sample Description : Bin 1/2 "						
Source: Minahy Asphalt PLANT						
DRY UNIT WT gm/cc Loose Rodded M.Contaent = Fineness =				WEIGHT OF SAMPLE IN GRAMS		
				Original,g	3333	
				Oven Dry,g	3333	
				Wash Oven Dry,g	3316	
				Washing Loss,g	17	
Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
2"	0	3333			100	
1 1/2"	0	3333			100.0	
1"	0	3333			100.0	
3/4"	0	3333			100.0	
1/2"	0	3333			100.0	
3/8"	640	2693			80.8	
#4	1786	907			27.2	
#8	340	567			17.0	
#16	193	373			11.2	
#30	213	160			4.8	
#50	45	115			3.5	
#100	65	50			1.5	
#200	30	20			0.6	
Pan	3					
Wash 200	17					
Total	3333					

M.E Controctor:





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 1/2 "

Source: Minahy Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	3164
Loose					Oven Dry,g	3164
Rodded					Wash Oven Dry,g	3150
M.Contaent =					Washing Loss,g	14
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"	0	3164				
1 1/2"	0	3164			100.0	
1"	0	3164			100.0	
3/4"	0	3164			100.0	
1/2"	0	3164			100.0	
3/8"	626	2538			80.2	
#4	1633	905			28.6	
#8	367	538			17.0	
#16	190	348			11.0	
#30	180	168			5.3	
#50	52	116			3.7	
#100	49	66			2.1	
#200	51	16			0.5	
Pan	2					
Wash 200	14					
Total	3164					

M.E Controctor:





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 1/2 "

Source: Minahy Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	3242
Loose					Oven Dry,g	3242
Rodded					Wash Oven Dry,g	3222
M.Contaent =					Washing Loss,g	20
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
2"	0	3242				
1 1/2"	0	3242			100.0	
1"	0	3242			100.00	
3/4"	0	3242			100.00	
1/2"	0	3242			100.00	
3/8"	681	2561			79.00	
#4	1589	973			30.00	
#8	402	571			17.60	
#16	195	376			11.60	
#30	214	162			5.00	
#50	32	130			4.00	
#100	71	58			1.80	
#200	36	23			0.70	
Pan	2					
Wash 200	20					
Total	3242					

M.E Controctor:





SIEVE ANALYSIS

AVG PASSING PERCENT

Sample Description : Bin 1/2 "

Source: Minahy Asphalt PLANT

Sieve Size	Cumulative Percent Passing	Cumulative Percent Passing	Cumulative Percent Passing	AVG Percent Passing	Governing Specs.
2"					
1 1/2"					
1"	100.0	100.0	100.0	100.0	
3/4"	100.0	100.0	100.0	100.0	
1/2"	100.00	100.00	100.00	100.0	
3/8"	80.80	80.20	79.00	80.0	
#4	27.20	28.60	30.00	28.6	
#8	17.00	17.00	17.60	17.2	
#16	11.20	11.00	11.60	11.3	
#30	4.80	5.30	5.00	5.0	
#50	3.45	3.66	4.00	3.7	
#100	1.50	2.10	1.80	1.8	
#200	0.60	0.50	0.70	0.6	
Pan					
Wash 200					
Total					

M.E Contractor:





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 3/4 "

Source: RACO Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Original,g 3574

Loose

Oven Dry,g 3574

Rodded

Wash Oven Dry,g 3552

M.Contaent =

Washing Loss,g 22

Fineness =

Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
					100	
2"	0	3574				
1 1/2"	0	3574			100.0	
1"	0	3574			100.0	
3/4"	0	3574			100.0	
1/2"	829	2745			76.8	
3/8"	1265	1480			41.40	
#4	986	493			13.80	
#8	340	154			4.30	
#16	75	79			2.20	
#30	14	64			1.80	
#50	7	57			1.60	
#100	18	39			1.10	
#200	14	25			0.70	
Pan	3					
Wash 200	22					
Total	3574					

M.E Controctor:

[Signature]





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 3/4 "

Source: RACO Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Original,g 3614

Loose

Oven Dry,g 3614

Rodded

Wash Oven Dry,g 3588

M.Contaent =

Washing Loss,g 26

Fineness =

Sieve Size	Weight Retained	Cumulative Weight passing	Cumulative Percent Passing	Governing Specs.
			100	
2"	0	3614		
1 1/2"	0	3614	100.0	
1"	0	3614	100.0	
3/4"	0	3614	100.0	
1/2"	744	2870	79.4	
3/8"	1424	1446	40.00	
#4	972	473	13.10	
#8	329	145	4.00	
#16	61	83	2.30	
#30	14	69	1.90	
#50	7	61	1.70	
#100	18	43	1.20	
#200	14	29	0.80	
Pan	3			
Wash 200	26			
Total	3614			

M.E Controctor:





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin 3/4 "

Source: RACO Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	3425
Loose					Oven Dry,g	3425
Rodded					Wash Oven Dry,g	3396
M.Contaent =					Washing Loss,g	29
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"	0	3425				
1 1/2"	0	3425			100.0	
1"	0	3425			100.00	
3/4"	0	3425			100.00	
1/2"	750	2675			78.10	
3/8"	1230	1445			42.20	
#4	1010	435			12.70	
#8	288	147			4.30	
#16	86	62			1.80	
#30	3	58			1.70	
#50	7	51			1.50	
#100	17	34			1.00	
#200	3	31			0.90	
Pan	2					
Wash 200	29					
Total	3425					

M.E Controctor:





SIEVE ANALYSIS

AVG PASSING PERCENT

Sample Description : Bin 3/4 "

Source: RACO Asphalt PLANT

Sieve Size	Cumulative Percent Passing	Cumulative Percent Passing	Cumulative Percent Passing	AVG Percent Passing	Governing Specs.
2"					
1 1/2"					
1"					
3/4"	100.0	100.0	100.0	100.0	
1/2"	76.80	79.40	78.10	78.10	
3/8"	41.40	40.00	42.20	41.20	
#4	13.80	13.10	12.70	13.20	
#8	4.30	4.00	4.30	4.20	
#16	2.20	2.30	1.80	2.10	
#30	1.80	1.90	1.70	1.80	
#50	1.60	1.70	1.50	1.60	
#100	1.10	1.20	1.00	1.10	
#200	0.70	0.80	0.90	0.80	
Pan					
Wash 200					
Total					

M.E Controctor:





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # Fillerr

Source: RACO Asphalt PLANT

WEIGHT OF SAMPLE IN GRAMS

DRY UNIT WT gm/cc

Loose

Rodded

M.Contaent =

Fineness =

Original,g 100

Oven Dry,g 100

Wash Oven Dry,g 17

Washing Loss,g 83

Sieve Size	Weight Retained	Cumulative Weight passing			Cumulative Percent Passing	Governing Specs.
					100	
2"						
1 1/2"						
1"						
3/4"						
1/2"						
3/8"						
#4						
#8						
#16	0	100			100.00	
#30	0	100			100.00	
#50	1	99			99.20	
#100	6	94			93.70	
#200	10	84			84.20	
Pan	1					
Wash 200	83					
Total	100					

M.E Controctor:





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # Fillerr

Source: RACO Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	100
Loose					Oven Dry,g	100
Rodded					Wash Oven Dry,g	17
M.Contaent =					Washing Loss,g	83
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"						
1 1/2"						
1"						
3/4"						
1/2"						
3/8"						
#4						
#8						
#16						
#30	0	100			100.00	
#50	1	99			99.00	
#100	6	94			93.50	
#200	10	84			83.60	
Pan	1					
Wash 200	83					
Total	100					

M.E Controctor:





SIEVE ANALYSIS

(AASHTO T-27/ASTM C-136)

Sample Description : Bin # Fillerr

Source: RACO Asphalt PLANT

					WEIGHT OF SAMPLE IN GRAMS	
DRY UNIT WT gm/cc					Original,g	100
Loose					Oven Dry,g	100
Rodded					Wash Oven Dry,g	17
M.Contaent =					Washing Loss,g	83
Fineness =					Cumulative	
Sieve Size	Weight Retained	Cumulative Weight passing			Percent Passing	Governing Specs.
					100	
2"						
1 1/2"						
1"						
3/4"						
1/2"						
3/8"						
#4						
#8						
#16						
#30	0	100			100.00	
#50	1	99			99.40	
#100	7	92			92.10	
#200	8	84			84.20	
Pan	1					
Wash 200	83					
Total	100					

M.E Controctor:





SIEVE ANALYSIS

Sample Description : Bin # Fillerr

Source: RACO Asphalt PLANT

Steve Size	Cumulative Percent Passing	Cumulative Percent Passing	Cumulative Percent Passing	AVG Percent Passing	Governing Specs.
2"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
#4					
#8					
#16					
#30	100.00	100.00	100.00	100.00	
#50	99.20	99.00	99.40	99.20	
#100	93.70	93.50	92.10	93.10	
#200	84.20	83.60	84.20	84.00	
Pan					
Wash 200					
Total					

M.E Controctor:





ABRASION OF COARSE AGGREGATE
By the use of Los Angeles machine

Project: مشاريع امانة محافظة جدة
Description: Blended Hot Bin
Sampled at: Asphalt Plant

TYPE OF GRADING					
SIEVE ANALYSIS		WEIGHT AND GRADING OF TEST SAMPLE, gm.			
PASSING	RETAINED	A	B	C	D
1-1/2"	1"	1250			-
1"	3/4"	1250			-
3/4"	1/2"	1250	2500		-
1/2"	3/8"	1250	2500		-
3/8"	1/4"	-	-	2500	-
1/4"	NO. 4	-	-	2500	-
NO. 4	NO. 8	-	-	-	5000
Total wt. of Sample, gm.		5000	5000	5000	5000
Abrasive Charges (No. of Spheres)		12	11	8	6

(a) Weight of sample before test = 5000 gm

(b) Weight of sample after 500 rev. retained on No.12 seive = 3570 gm

(c) Percentage of wear = $100 \times [(a - b) / a]$ = 28.6 %

REMARKS: Specified % Loss= 40 Max.
Grading B is tested.

Contractor





ABRASION OF COARSE AGGREGATE
By the use of Los Angeles machine

Project: مشاريع أمانة محافظة جدة
Description: Blended Hot Bin
Sampled at: Asphalt Plant

TYPE OF GRADING					
SIEVE ANALYSIS		WEIGHT AND GRADING OF TEST SAMPLE, gm.			
PASSING	RETAINED	A	B	C	D
1-1/2"	1"	1250			-
1"	3/4"	1250			-
3/4"	1/2"	1250	2500		-
1/2"	3/8"	1250	2500		-
3/8"	1/4"	-	-	2500	-
1/4"	NO. 4	-	-	2500	-
NO. 4	NO. 8	-	-	-	5000
Total wt. of Sample, gm.		5000	5000	5000	5000
Abrasive Charges (No. of Spheres)		12	11	8	6

(a) Weight of sample before test = 5002 gm

(b) Weight of sample after 500 rev. retained on No.12 seive = 3512 gm

(c) Percentage of wear = $100 \times [(a - b) / a]$ = 29.78 %

REMARKS: Specified % Loss= 40 Max.
Grading C is tested.

Contractor





ABRASION OF COARSE AGGREGATE

By the use of Los Angeles machine

Project: مشاريع أمانة محافظة جدة
Description: Blended Hot Bin
Sampled at: Asphalt Plant

TYPE OF GRADING					
SIEVE ANALYSIS		WEIGHT AND GRADING OF TEST SAMPLE, gm.			
PASSING	RETAINED	A	B	C	D
1-1/2"	1"	1250			-
1"	3/4"	1250			-
3/4"	1/2"	1250	2500		-
1/2"	3/8"	1250	2500		-
3/8"	1/4"	-	-	2500	-
1/4"	NO. 4	-	-	2500	-
NO. 4	NO. 8	-	-	-	5000
Total wt. of Sample, gm.		5000	5000	5000	5000
Abrasive Charges (No. of Spheres)		12	11	8	6

(a) Weight of sample before test = 5000 gm

(b) Weight of sample after 500 rev. retained on No.12 seive = 3333 gm

(c) Percentage of wear = $100 \times [(a - b) / a]$ = 33.3 %

REMARKS: Specified % Loss= 40 Max.

Grading D is tested.

Contractor





ABRASION OF COARSE AGGREGATE
By the use of Los Angeles machine

Project: مشاريع امانة محافظة جدة
Description: Blended Hot Bin
Sampled at: Asphalt Plant

ABRASION OF COARSE AGGREGATE BY USE OF THE LOS ANGELES MACHINE.

SAMMARY

	B	C	D	AVERAGE
PERCENTAGE OF WEAR	28.6	29.8	33.3	30.6

REMARKS: Specification Required - 40 % Maximum

Contractor





SOUNDNESS OF AGGREGATE BY USE OF SODIUM SULPHATE

MRDTM - 311, AASHTO T - 104

Project: مشاريع امانة جدة

Description: Samples Form Hot Bin

Sampled At: Asphalt Plant

Coarse Aggregate

SIEVE SIZE		ORIGINAL GRADING %	WT. OF TEST SAMPLE	AFTER TEST SIEVE SIZE	RETAINED MASS g	PASSING MASS g	Passing Mass %	WEIGHTED PER.Mass
PASSING	RETAINED	A	B	C	D	E	F	G
3/4"	3/8"	21.5	1002.1	5/16"	971.6	30.5	3.04	0.65
3/8"	No.4	22.1	500.2	No. 5	472.0	28.2	5.64	1.25
TOTAL		43.60						1.90

Loss Corrected for 100% =

4.36

Specified Loss % =

10.0 Max.

Fine Aggregate

SIEVE SIZE		ORIGINAL GRADING %	WT. OF TEST SAMPLE	AFTER TEST SIEVE SIZE	RETAINED MASS g	PASSING MASS g	Passing Mass %	WEIGHTED PER.Mass
PASSING	RETAINED	A	B	C	D	E	F	G
No: 4	No: 8	17.6	101.3	No. 8	98.2	3.1	3.06	0.54
No: 8	No: 16	9.0	100.5	No. 16	95.8	4.7	4.68	0.42
No:16	No:30	7.8	101.8	No. 30	96.3	5.5	5.40	0.42
No:30	No: 50	7.7	100.4	No. 50	98.0	2.4	2.39	0.18
TOTAL		42.10						1.56

Loss Corrected for 100% =

3.72

Specified Loss % =

10.0 Max.

REMARKS:

Sodium Sulphate Solution was used for test with sp.gr of 1.162

M.E Contractor





SPECIFIC GRAVITY AND ABSORPTION OF AGGREGATES

MRDTM 304 & 305, AASHTO T- 84 & 85

COARSE AGGREGATE

Project: : مشاريع امارة جدة
Description: 3/4" Agg. From Hot Bin
Sampled At: Asphalt Plant

Description	1	2	Average
1. Weight of saturated surface dry sample in air (gm)	4154.5	4135.3	
2. Weight of Oven dry sample in air (gm)	4125.3	4106.6	
3. Weight of saturated surface dry sample in water (gm)	2701.3	2690.0	
4. Absorption = Line1 - Line 2, (gm)	29.2	28.7	
5. % Absorption = Line 4/Line 2 * 100	0.708	0.699	0.703
6. Specific Gravity:			
(a) Bulk, Oven-dry =Line 2/(Line1 - Line 3)	2.839	2.841	2.840
(b) Bulk, sat.surf.dry =Line1/(Line1 - Line 3)	2.859	2.861	2.860
(c) Apparent = Line 2/(Line2 - Line 3)	2.897	2.899	2.898

FINE AGGREGATE

Project: _____ Sample No: _____
Description: _____ Sampled by: _____
Sampled At: _____ Date sampled: _____

Description	1	2	Average
7. Weight of saturated surface dry sample (gm)			
8. Weight of Oven dry sample (gm)			
9. Weight of bottle filled with water (gm)			
10. Wt. Of bottle with sat.surf.dry sample & water (gm)			
11. Absorption = (Line 7 - Line 8)			
12. % Absorption = Line 11/Line8 * 100			
13. Specific Gravity:			
(a) Bulk, Oven-dry =Line 8 / (Line 7+Line 9-Line 10)			
(b) Bulk, sat.surf.dry =Line7 / (Line 7+Line 9 - Line 10)			
(c) Apparent = Line 8 / (Line 8 + line 9 - Line 10)			

M.E Contractor





SPECIFIC GRAVITY AND ABSORPTION OF AGGREGATES

MRDTM 304 & 305, AASHTO T- 84 & 85

COARSE AGGREGATE

Project: : مشاريع امانة جدة
Description: 1/2" Agg. From Hot Bin
Sampled At: Asphal Plant

Description	1	2	Average
1. Weight of saturated surface dry sample in air (gm)	3063.6	3152.5	
2. Weight of Oven dry sample in air (gm)	3023.0	3111.1	
3. Weight of saturated surface dry sample in water (gm)	1972.4	2032.0	
4. Absorption = Line1 - Line 2, (gm)	40.6	41.4	
5. % Absorption = Line 4/Line 2 * 100	1.343	1.330	1.337
6. Specific Gravity:			
(a) Bulk, Oven-dry = Line 2/(Line1 - Line 3)	2.770	2.777	2.773
(b) Bulk, sat.surf.dry = Line1/(Line1 - Line 3)	2.808	2.813	2.811
(c) Apparent = Line 2/(Line2 - Line 3)	2.877	2.883	2.880

FINE AGGREGATE

Project: _____ Sample No: _____
Description: _____ Sampled by: _____
Sampled At: _____ Date sampled: _____

Description	1	2	Average
7. Weight of saturated surface dry sample (gm)			
8. Weight of Oven dry sample (gm)			
9. Weight of bottle filled with water (gm)			
10. Wt. Of bottle with sat.surf.dry sample & water (gm)			
11. Absorption = (Line 7 - Line 8)			
12. % Absorption = Line 11/Line8 * 100			
13. Specific Gravity:			
(a) Bulk, Oven-dry = Line 8 / (Line 7+Line 9-Line 10)			
(b) Bulk, sat.surf.dry = Line7 / (Line 7+Line 9 - Line 10)			
(c) Apparent = Line 8 / (Line 8 + line 9 - Line 10)			

M.E Contractor





SPECIFIC GRAVITY AND ABSORPTION OF AGGREGATES

MRDTM 304 & 305, AASHTO T- 84 & 85

COARSE AGGREGATE

Project: مشاريع امانة جدة
Description: Crushed sand
Sampled At: Asphalt Plant

Description	1	2	Average
1. Weight of saturated surface dry sample in air (gm)			
2. Weight of Oven dry sample in air (gm)			
3. Weight of saturated surface dry sample in water (gm)			
4. Absorption = Line1 - Line 2, (gm)			
5. % Absorption = Line 4/Line 2 * 100			
6. Specific Gravity:			
(a) Bulk, Oven-dry =Line 2/(Line1 - Line 3)			
(b) Bulk, sat.surf.dry =Line1/(Line1 - Line 3)			
(c) Apparent = Line 2/(Line2 - Line 3)			

FINE AGGREGATE

Project: مشاريع امانة جدة
Description: Crushed sand from hot bin
Sampled At: Asphalt Plant

Description	1	2	Average
7. Weight of saturated surface dry sample (gm)	504.2	505.6	
8. Weight of Oven dry sample (gm)	495.3	496.8	
9. Weight of bottle filled with water (gm)	703.7	703.7	
10. Wt. Of bottle with sat.surf.dry sample & water (gm)	1025.8	1026.8	
11. Absorption = (Line 7 - Line 8)	8.9	8.8	
12. % Absorption = Line 11/Line8 * 100	1.797	1.771	1.784
13. Specific Gravity:			
(a) Bulk, Oven-dry =Line 8 / (Line 7+Line 9-Line 10)	2.720	2.722	2.721
(b) Bulk, sat.surf.dry =Line7 / (Line 7+Line 9 - Line 10)	2.769	2.770	2.770
(c) Apparent = Line 8 / (Line 8 + line 9 - Line 10)	2.860	2.860	2.860

M.E Contractor





SPECIFIC GRAVITY AND ABSORPTION OF AGGREGATES

MRD TM 304 & 305, AASHTO T-84 & 85

COARSE AGGREGATE

Project: مشاريع امانة جدة
Description: Filler
Sampled At: Asphalt plant

Description	1	2	Average
1. Weight of saturated surface dry sample in air (gm)			
2. Weight of Oven dry sample in air (gm)			
3. Weight of saturated surface dry sample in water (gm)			
4. Absorption = Line 1 - Line 2, (gm)			
5. % Absorption = Line 4/Line 2 * 100			
6. Specific Gravity:			
(a) Bulk, Oven-dry = Line 2/(Line 1 - Line 3)			
(b) Bulk, sat.surf.dry = Line 1/(Line 1 - Line 3)			
(c) Apparent = Line 2/(Line 2 - Line 3)			

FINE AGGREGATE

Project: مشاريع امانة جدة
Description: Filler
Sampled At: Asphalt plant Date sampled: _____

Description	1	2	Average
7. Weight of saturated surface dry sample (gm)			
8. Weight of Oven dry sample (gm)	200.0	200.0	
9. Weight of bottle filled with water (gm)	675.6	675.6	
10. Wt. Of bottle with sat.surf.dry sample & water (gm)	804.6	804.3	
11. Absorption = (Line 7 - Line 8)			
12. % Absorption = Line 11/Line 8 * 100			
13. Specific Gravity:			
(a) Bulk, Oven-dry = Line 8 / (Line 7+Line 9-Line 10)			
(b) Bulk, sat.surf.dry = Line 7 / (Line 7+Line 9 - Line 10)			
(c) Apparent = Line 8 / (Line 8 + line 9 - Line 10)	2.817	2.805	2.811

M.E Contractor





Project: _____
Description: Samples Form Hot Bin
Sampled At: Asphal Plant

THIN AND ELONGATED PARTICLES

AASHTO M-80 , ASTM C-125

COARSE AGGREGATE

SIEVE SIZES	1" - 3/4"	3/4" - 3/8"	3/8" - # 4	Total
Total Wt. of Sample, gm.		3242.1	2426.3	5668.4
Wt. of Thin and Elongated particles, gm		100.5	125.4	310.9
% Thin and Elongated particles		3.1	5.2	8.3
Original Grading % Retained		21.5	22.1	59.9
Weighted % Thin and Elongated particles		0.7	1.1	2.5
Thin and Elongated particles, adjusted for 100 %	4.1			

Remarks: Specified %max. 10

M.E Contractor



Certificate No: HOM/CCJ/13525 -1

Date : February 13, 2024

M/S Road Accomplishments Co Ltd - RACO

Bariman - Jeddah
K.S.A

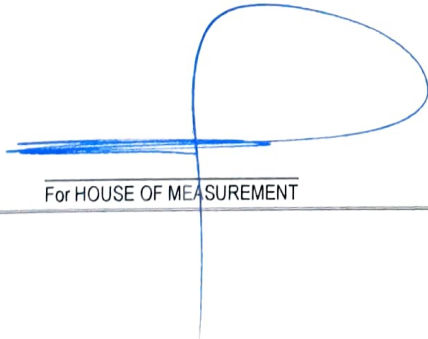
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CERTIFICATE OF CALIBRATION

CERTIFIES THAT THE INSTRUMENT LISTED BELOW HAS BEEN TESTED / CALIBRATED USING STANDARDS WHOSE ACCURACY'S ARE TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY USA. WITHIN THE LIMITATION OF THESE LABORATORIES CALIBRATION SERVICES, OR HAVE BEEN DERIVED BY THE RATIO OF SELF-CALIBRATION TECHNIQUES. INFORMATION ON THE CALIBRATION PROCESS AND ITS RESULTS IS GIVEN BELOW.

DESCRIPTION	:	Weighing Scale
MADE BY	:	Ohaus
SERIAL NO	:	8338500086
RANGE	:	30 Kg
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION


For HOUSE OF MEASUREMENT

Certificate No:HOM/CCJ/13525 -2

Date : February 13, 2024

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K.S.A

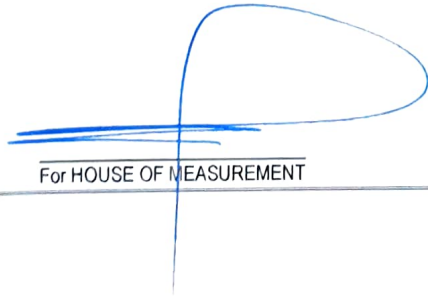
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DESCRIPTION	:	Weighing Scale
MADE BY	:	Radag
SERIAL NO	:	382989 / 13
RANGE	:	6000 Gm
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION


For HOUSE OF MEASUREMENT

Certificate No:HOM/CCJ/13525-3

Date : February 13, 2024

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CERTIFICATE OF CALIBRATION

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DESCRIPTION	:	Electric Oven
MADE BY	:	SNOL
SERIAL NO	:	429
RANGE	:	200 °C
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION

For HOUSE OF MEASUREMENT



Certificate No: HOM/CCJ/13525 -4

Date : February 13, 2024

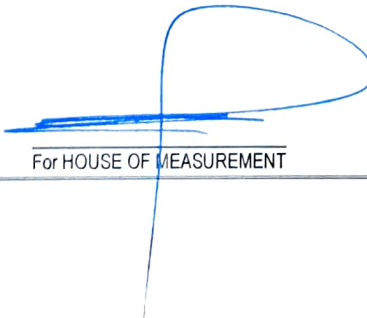
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DESCRIPTION	:	R.T.F RollingThin Film Oven
MADE BY	:	Controls
SERIAL NO	:	13005635
RANGE	:	250 °C
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION


For HOUSE OF MEASUREMENT



Certificate No:HOM/CCJ/13525 -5

Date : February 13, 2024

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DESCRIPTION	:	Water Bath
MADE BY	:	Humboldt Mfg Co
SERIAL NO	:	H -1394 - 4 F
RANGE	:	100 °C
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION

For HOUSE OF MEASUREMENT



Certificate No:HOM/CCJ/13525 -6

Date : February 13, 2024

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DESCRIPTION	:	Maximum Specific Gravity - GMM
MADE BY	:	Robinair - Cool Tech
SERIAL NO	:	062663
RANGE	:	142 L/M
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION

For HOUSE OF MEASUREMENT



Certificate No: HOM/CCJ/13535 -7

Date : February 13, 2024

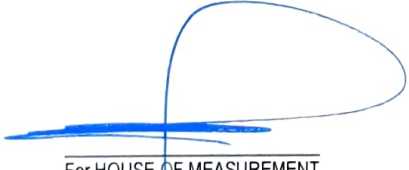
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CERTIFICATE OF CALIBRATION

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DESCRIPTION	:	Marshall Proving Ring Tester
MADE BY / MODEL	:	Citizen Labs
SERIAL NO	:	02220700099
RANGE	:	50 KN
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION


For HOUSE OF MEASUREMENT



Certificate No: HOM/CCJ/13535 -8

Date : February 13, 2024

MS Road Accomplishments Co Ltd - RACO
Bariman - Jeddah
K.S.A

ISO / IEC 17025 : 2017
CERTIFICATE OF CALIBRATION

CERTIFIES THAT THE INSTRUMENT LISTED BELOW HAS BEEN TESTED / CALIBRATED USING STANDARDS WHOSE ACCURACY'S ARE TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY USA. WITHIN THE LIMITATION OF THESE LABORATORIES CALIBRATION SERVICES, OR HAVE BEEN DERIVED BY THE RATIO OF SELF-CALIBRATION TECHNIQUES. INFORMATION ON THE CALIBRATION PROCESS AND ITS RESULTS IS GIVEN BELOW.

DESCRIPTION	:	CBR Proving Ring Tester
MADE BY / MODEL	:	Citizen Labs
SERIAL NO	:	0522120229
RANGE	:	50 KN
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION

For HOUSE OF MEASUREMENT



Certificate No:HOM/CCJ/13535 -9

Date : February 13, 2024

M/S Road Accomplishments Co Ltd - RACO
Bariman - Jeddah
K.S.A

ISO / IEC 17025 : 2017
CERTIFICATE OF CALIBRATION

CERTIFIES THAT THE INSTRUMENT LISTED BELOW HAS BEEN TESTED / CALIBRATED USING STANDARDS WHOSE ACCURACY'S ARE TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY USA. WITHIN THE LIMITATION OF THESE LABORATORIES CALIBRATION SERVICES, OR HAVE BEEN DERIVED BY THE RATIO OF SELF-CALIBRATION TECHNIQUES. INFORMATION ON THE CALIBRATION PROCESS AND ITS RESULTS IS GIVEN BELOW.

DESCRIPTION	:	Compression Test Machine
MADE BY	:	Controls
SERIAL NO	:	1700286
RANGE	:	3000 KN
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION


For HOUSE OF MEASUREMENT



Certificate No: HOM/CCJ/13535 -10 / 1 & 2

Date : February 13, 2024

M/S Road Accomplishments Co Ltd - RACO
Bariman - Jeddah
K.S.A

ISO / IEC 17025 : 2017

CERTIFICATE OF CALIBRATION

CERTIFIES THAT THE INSTRUMENT LISTED BELOW HAS BEEN TESTED / CALIBRATED USING STANDARDS WHOSE ACCURACY'S ARE TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY USA. WITHIN THE LIMITATION OF THESE LABORATORIES CALIBRATION SERVICES, OR HAVE BEEN DERIVED BY THE RATIO OF SELF-CALIBRATION TECHNIQUES. INFORMATION ON THE CALIBRATION PROCESS AND ITS RESULTS IS GIVEN BELOW.

DESCRIPTION	:	Gyratory Compactor
MADE BY	:	Controls
SERIAL NO	:	13004351
RANGE	:	600 Psi Height 114.39 mm To 114.41 mm KPA 599 – To KPA 601
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION

For HOUSE OF MEASUREMENT



Certificate No:HOM/CCJ/13535 -11 / 1 & 2

Date : February 13, 2024

M/S Road Accomplishments Co Ltd - RACO
Bariman - Jeddah
K.S.A

ISO / IEC 17025 : 2017
CERTIFICATE OF CALIBRATION

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DESCRIPTION	:	Viscometer
MADE BY	:	Brookfield Eng Lab – USA
SERIAL NO	:	8570681
RANGE	:	200 °C
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION

For HOUSE OF MEASUREMENT



Certificate No:HOM/CCJ/13535 -12

Date : February 13, 2024

M/S Road Accomplishments Co Ltd - RACO
Bariman - Jeddah
K.S.A

ISO / IEC 17025 - 2017
CERTIFICATE OF CALIBRATION

CERTIFIES THAT THE INSTRUMENT LISTED BELOW HAS BEEN TESTED / CALIBRATED USING STANDARDS WHOSE ACCURACY'S ARE TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY USA. WITHIN THE LIMITATION OF THESE LABORATORIES CALIBRATION SERVICES, OR HAVE BEEN DERIVED BY THE RATIO OF SELF-CALIBRATION TECHNIQUES. INFORMATION ON THE CALIBRATION PROCESS AND ITS RESULTS IS GIVEN IN THE CONTINUATION AS PER ATTACHMENT OF THIS DOCUMENT.

DESCRIPTION	:	LIQUID LIMIT DEVICE TESTER
MADE BY	:	MATEST
SERIAL NO.	:	S170 205 - CUP 200 Gm
HEIGHT DROP	:	197.50 / 197.49 / 197.49 $\pm$ 0.2 mm (Passed)
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION

For HOUSE OF MEASUREMENT



Certificate No: HOM/CCJ/13535 -13

Date : February 13, 2024

M/S Road Accomplishments Co Ltd - RACO
Bariman - Jeddah
K.S.A

ISO / IEC 17025 : 2017
CERTIFICATE OF CALIBRATION

CERTIFIES THAT THE INSTRUMENT LISTED BELOW HAS BEEN TESTED / CALIBRATED USING STANDARDS WHOSE ACCURACY'S ARE TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY USA. WITHIN THE LIMITATION OF THESE LABORATORIES CALIBRATION SERVICES, OR HAVE BEEN DERIVED BY THE RATIO OF SELF-CALIBRATION TECHNIQUES. INFORMATION ON THE CALIBRATION PROCESS AND ITS RESULTS IS GIVEN BELOW.

DESCRIPTION	:	Loss Angles Abrasion Machine
MADE BY	:	Matest Treviolo 24048
SERIAL NO	:	A075X / AC/ 0004
RANGE	:	9999 / 12 Balls
LOCATION	:	Bariman - Jeddah
DATE OF CALIBRATION	:	February 11, 2024
NEXT CALIBRATION DUE	:	February 11, 2025

CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION

For HOUSE OF MEASUREMENT



Certificate No :HOM/CCJ/13713

Date: June 26, 2024

M/s Enjaz Al Turk CompanyRoad Accomplishment Ltd . For Contracting - RACO
Jeddah - K.S.A

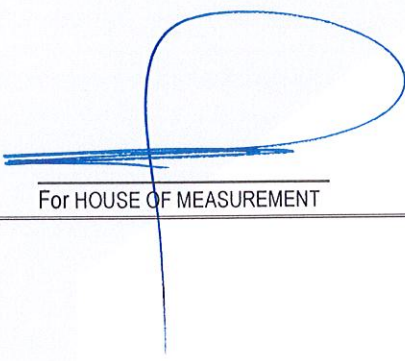
ISO / IEC 17025 -2017 & TUV - ISO 9001 : 2015

CERTIFICATE OF CALIBRATION

CERTIFIES THAT THE INSTRUMENT LISTED BELOW HAS BEEN TESTED / CALIBRATED USING STANDARDS WHOSE ACCURACY'S ARE TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY USA. WITHIN THE LIMITATION OF THESE LABORATORIES CALIBRATION SERVICES, OR HAVE BEEN DERIVED BY THE RATIO OF SELF-CALIBRATION TECHNIQUES. INFORMATION ON THE CALIBRATION PROCESS AND ITS RESULTS IS GIVEN IN THE CONTINUATION AS PER ATTACHMENT OF THIS DOCUMENT.

DESCRIPTION	:	ASPHALT PLANT
PLANT	:	AMP 2500 C
SCALE TYPE	:	ELECTRONIC - METTLER TOLEDO IND 320 L
DETAILS	:	AGGRIGATE SCALE BITUMEN SCALE FILLER SCALE
PLANT LOCATION	:	BARIMAN - AREA
DATE OF CALIBRATION	:	JUNE 26, 2024
NEXT CALIBRATION DUE	:	JUNE 26, 2025

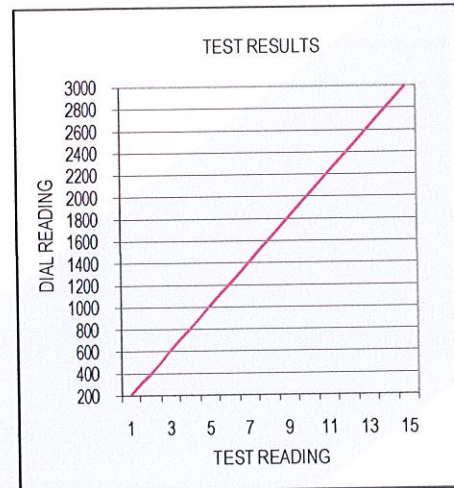
CERTIFICATE IS VALID FOR ONE (1) YEAR FROM DATE OF CALIBRATION.


For HOUSE OF MEASUREMENT

TEST RESULT OF CALIBRATION

Company	Enjaz Al Turk Company / Road Accomplishment Ltd for Contracting RACO		
Address	Jeddaah - Bariman K.S.A		
Location	Bairam	Certificate No:HOM/CC/J/13713	
Equipment Type	Aggregate Scale	ScaleType	Mettler IND320 L
Plant	AMP 2500 C	S.No	B 511707046
Capacity	4000 Kg x 1 Kg	Date of Cal	26/06/2024

Indicator Readings	Test-1 Kg	Test-2 Kg	Test-3 Kg	Mean Kg	Error. %
200	200	200	200	200	0
400	400	400	400	400	0
605	605	605	605	605	0
803	803	803	803	803	0
1004	1004	1004	1004	1004	0
1205	1205	1205	1205	1205	0
1402	1402	1402	1402	1402	0
1603	1603	1603	1603	1603	0
1804	1804	1804	1804	1804	0
2005	2005	2005	2005	2005	0
2206	2206	2206	2206	2206	0
2403	2405	2403	2403	2404	0.03
2602	2604	2603	2602	2603	0.04
2804	2806	2805	2804	2805	0.04
3002	3005	3003	3002	3003	0.04



ABOVE INSTRUMENT HAS BEEN TESTED AND CALIBRATED BY USING SASO STANDARD ABOVE READINGS HAVE BEEN FOUND WITH IN TOLERANCE LIMIT. RESULTS ARE INTERPRETED AND COMPLAINE WITH ASTM E4-93 STANDARD.

BASIS OF TEST	WORKING WITH IN TOLERANCE LIMIT	PASS
EQUIPMENT CONDITION	EQUIPMENT WAS ADJUSTED	YES
ADDITIONAL COMMENTS	EQUIPMENT REQUIRED REPAIRING	NO

THIS CERTIFICATE IS VALID FOR ONE (1) YEAR FROM THE DATE OF CALIBRATION.


For HOUSE OF MEASUREMENT

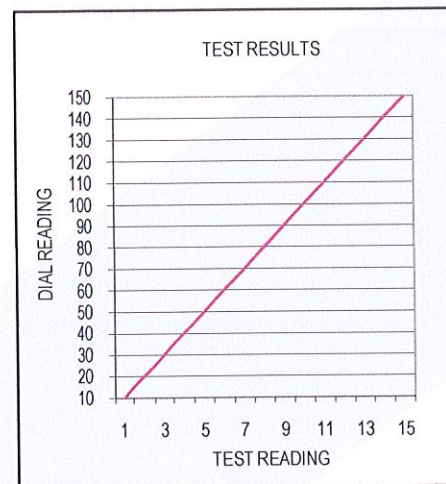



CALIBRATED BY

TEST RESULT OF CALIBRATION

Company	Enjaz Al Turk Company / Road Accomplishment Ltd for Contracting RACO		
Address	Jeddaah - Bariman K.S.A		
Location	Bairam		
	Certificate No:HOM/CC/J/13713		
Equipment Type	Bitumen Scale	ScaleType	Mettler IND320 L
Plant	AMP 2500 C	S.No	B 511707045
Capacity	400 Kg x 0.1 Kg	Date of Cal	26/06/2024

Indicator Readings	Test-1 Kg	Test-2 Kg	Test-3 Kg	Mean Kg	Error. %
10	10	10	10	10	0
20	20	20	20	20	0
30	30	30	30	30	0
40	40	40	40	40	0
50	50	50	50	50	0
60	60	60	60	60	0
70	70	70	70	70	0
80	80	80	80	80	0
90	90	90	90	90	0
100	100	100	100	100	0
110	110	110	110	110	0
120	120	120	120	120	0
130	130	130	130	130	0
140	139.9	140.0	140.0	140.0	0.02
150	149.9	150.0	150.0	150.0	0.02



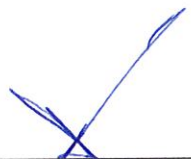
ABOVE INSTRUMENT HAS BEEN TESTED AND CALIBRATED BY USING SASO STANDARD ABOVE READINGS HAVE BEEN FOUND WITH IN TOLERANCE LIMIT. RESULTS ARE INTERPRETED AND COMPLAINT WITH ASTM E4-93 STANDARD.

BASIS OF TEST	WORKING WITH IN TOLERANCE LIMIT	PASS
EQUIPMENT CONDITION	EQUIPMENT WAS ADJUSTED	YES
ADDITIONAL COMMENTS	EQUIPMENT REQUIRED REPAIRING	NO

THIS CERTIFICATE IS VALID FOR ONE (1) YEAR FROM THE DATE OF CALIBRATION.


For HOUSE OF MEASUREMENT

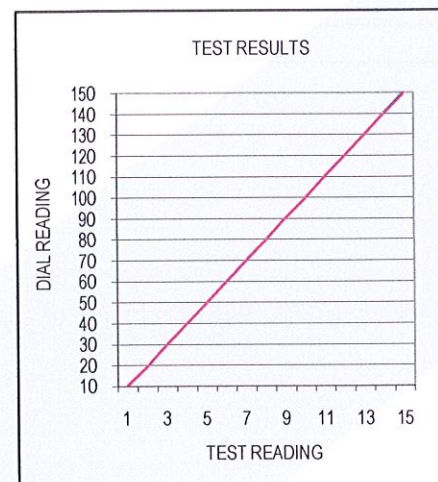



CALIBRATED BY

TEST RESULT OF CALIBRATION

Company	Enjaz Al Turk Company / Road Accomplishment Ltd for Contracting RACO		
Address	Jeddaah - Bariman K.S.A		
Location	Bairam		
	Certificate No:HOM/CCJ/13713		
Equipment Type	Filler Scale	Flow Meter	Mettler IND320 L
Plant	AMP 2500 C	S.No	B 511707044
Capacity	400 Kg x 0.1 Kg	Date of Cal	26/06/2024

Indicator Readings	Test-1 Kg	Test-2 Kg	Test-3 Kg	Mean Kg	Error. %
10	10	10	10	10	0
20	20	20	20	20	0
30	30	30	30	30	0
40	40	40	40	40	0
50	50	50	50	50	0
60	60	60	60	60	0
70	70	70	70	70	0
80	80	80	80	80	0
90	90	90	90	90	0
100	100	100	100	100	0
110	110	110	110	110	0
120	120	120	120	120	0
130	130	130	130	130	0
140	139.9	139.9	140.0	139.9	0.05
150	149.9	149.9	150.0	149.9	0.04



ABOVE INSTRUMENT HAS BEEN TESTED AND CALIBRATED BY USING SASO STANDARD ABOVE READINGS HAVE BEEN FOUND WITH IN TOLERANCE LIMIT. RESULTS ARE INTERPRETED AND COMPLAINE WITH ASTM E4-93 STANDARD.

BASIS OF TEST		
EQUIPMENT CONDITION	WORKING WITH IN TOLERANCE LIMIT	PASS
	EQUIPMENT WAS ADJUSTED	YES
ADDITIONAL COMMENTS	EQUIPMENT REQUIRED REPAIRING	NO

THIS CERTIFICATE IS VALID FOR ONE (1) YEAR FROM THE DATE OF CALIBRATION.


For HOUSE OF MEASUREMENT




CALIBRATED BY

الهوية الوطنية
رقم النسخة



المملكة العربية السعودية
وزارة الداخلية

طلعت بن محمدنور بن يحي حبيب الله

HABIBULLAH, TALAT MOHAMMEDNAOAR Y



No: 1054123466

الرقم : ١٠٥٤١٢٣٤٦٦

DOB: 23/04/1967

تاريخ الميلاد : ١٣٨٧/٠١/١٣

DOE: 13/05/2038

تاريخ الانتهاء : ١٤٦٠/٠٤/٠٩



1054123466

مكان الميلاد : مكة المكرمة

رقم: ٤٦٠٠٠١٧٠٩٤
تاريخ: ١٤٤٦/٠٢/١٠ هـ
نسخة: أهل المعاملة

أمانة
جدة



بيانات الطلب الإلكتروني

رقم الطلب	٢٩٩٦٧٨	التاريخ	الثلاثاء ١٤٤٦/٠٢/٠٩ هـ
الموضوع	بخصوص تحديث اعتماد الخلطة الاسفلتية (BWC SP)		
مقدم الطلب	طلعت محمدنور يحي حبيب الله (مفوض عن) شركة انجاز الطرق للمقاولات المحدوده		
رقم الجوال	٠٥٠٠٠٩٧٨٤٧		

ملاحظات	
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تنويه : هذا النموذج تم تكوينه بشكل تلقائي عن طريق نظام الاتصالات الإدارية بناء على مدخلات المواطن من خلال بوابة الخدمات الالكترونية ويتحمل المواطن كامل المسؤولية القانونية لمحتوى هذا الخطاب